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Table of Contents.

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	Page.
ORIGINAL ARTICLES—	
Acute Hæmorrhagic Leucoencephalitis: A Previously Undefined Entity, by E. Weston Hurst	1
Pyelography after the Subcutaneous Injection of Dye, by Henry Mortensen, M.S., F.R.C.S., F.R.A.C.S.	6
REPORTS OF CASES—	
Hydatidiform Mole and Chorionepithelioma: A Report of Two Cases, by Arthur M. Hill	7
Acute Suppurative Otitis Media and Mastoiditis with Severe Hæmorrhage from the Ear: Presumed Erosion of the Internal Carotid Artery, Ligation of Internal, External and Common Carotid Arteries, by C. M. Eadie, M.B., B.S., F.R.A.C.S.	9
REVIEWS—	
Orthopædic Operations	12
Medical Electricity	12
Forensic Medicine	12
LEADING ARTICLES—	
The Medical Student and Public Health	13
CURRENT COMMENT—	
Low Blood Pressure and Aviation	14
ABSTRACTS FROM MEDICAL LITERATURE—	
Therapeutics	16
Neurology and Psychiatry	16
MEDICAL SOCIETIES—	
Melbourne Pædiatric Society	18
POST-GRADUATE WORK—	
Week-End Course in Medicine at Sydney	19
THE ROYAL AUSTRALASIAN COLLEGE OF PHYSICIANS—	
Examination for Membership	19
CORRESPONDENCE—	
Syphilis in Pregnant Women	19
Post-War Shortage of Medical Practitioners	19
Medical Certification for Munitions Workers	20
Venereal Disease	20
The Late George Adlington Syme's Service in Egypt	20
NAVAL, MILITARY AND AIR FORCE—	
National Security (Medical Co-Ordination and Equipment) Regulations	20
Appointments	21
Casualties	21
UNIVERSITY INTELLIGENCE—	
The University of Sydney	21
MEDICAL WAR RELIEF FUND	21
OBITUARY—	
John Ferguson Chambers	21
Harry Clarendon Whittle	22
NOTICE	22
MEDICAL APPOINTMENTS	22
BOOKS RECEIVED	22
DIARY FOR THE MONTH	22
MEDICAL APPOINTMENTS: IMPORTANT NOTICE	22
EDITORIAL NOTICES	22

ACUTE HÆMORRHAGIC LEUCOENCEPHALITIS: A PREVIOUSLY UNDEFINED ENTITY.[1]

By E. WESTON HURST,

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IN 1939 Hurst, de Crespigny and Fry[(1)] drew attention to the frequent occurrence in South Australia of some of the rarer demyelinating diseases. Since then I have seen clinically three other patients, for whose condition a diagnosis of Schilder's encephalitis (diffuse sclerosis) appeared justified. These were seen through the goodwill of a few physicians; were there in Adelaide a neurological clinic, it is probable that still other cases would have been detected. Recently an unusual case of demyelination restricted to the brain stem came to autopsy; it will form the subject of a future publication by Sir Trent Champion de Crespigny and myself.

The present paper deals with two cases of a much more acute cerebral condition, virtually localized as far as the cerebrum was concerned to the white matter, and developing more or less abruptly in apparently normal individuals. Perivascular necroses, perivascular and focal demyelination, hæmorrhages, œdema and cellular infiltration were the chief components of the pathological picture. No exactly similar cases appear to be on record in the literature, though, as will be shown later, recent descriptions of at least two conditions cover a part of the pathology of these cases. Later I shall advance reasons for considering this condition as one of the most acute representatives of the group of demyelinating maladies; in the meantime I shall refer to it as "acute hæmorrhagic leucoencephalitis". An addendum to this paper describes the symptoms of a third patient, who may well have suffered from the same condition, but of whom a post-mortem examination was refused.

[1] Work done with the aid of an expenses grant from the National Health and Medical Research Council.

REPORTS OF CASES.

Case I.

M.T., aged thirty-three years, was a housewife. For years she had suffered from migraine and from achlorhydria. In October, 1939, she contracted bronchopneumonia. Her final illness followed a period during which she had felt in better health than previously.

On January 17, 1940, on rising in the morning, the patient felt giddy and weak on one side; she also complained of headache. She became progressively weaker. Speech was distorted and within twelve hours impossible. She could swallow but could not chew food.

On her admission to hospital the patient was confused mentally, though her hearing and sight were normal. A flaccid paralysis of the right side of the body involved face, tongue, arm and leg. Except for the ankle jerk, the tendon reflexes were absent on this side. The plantar reflexes were flexor in type and the abdominal reflexes were absent. No other abnormal signs were detected. The temperature ranged from 100° to 101° F. during the period in hospital. Death occurred about forty-two hours after the onset of symptoms.

Post-Mortem Findings.

At autopsy no abnormality was detected in the abdominal or thoracic viscera.

The left cerebral hemisphere was distinctly swollen. Coronal section at the level of the stalk of the pituitary revealed an œdematous *centrum semi-ovale* speckled with hæmorrhages except in the temporal region (Figure I). In one convolution on the lateral surface, about two inches from the vertex, a greyish translucent area enclosed a smaller and wholly gelatinous area. Lesions were confined almost exclusively to the white matter, and an intact band of U-fibres almost always separated them from the normal

cortex. In very few places did they spread into the cortex or other areas of grey matter. The upper part of the *corpus callosum*, adjacent regions of white matter in the right hemisphere, and parts of the white matter ventral to the right lenticular nucleus were similarly involved.

On the left side these appearances continued anteriorly and posteriorly for a distance of several centimetres. Further anteriorly and posteriorly the white matter was the seat of pronounced œdema and congestion, without other macroscopic changes. Here also the U-fibres appeared intact, as did the cerebral cortex. Only in the extreme frontal and the occipital and temporal regions did the white matter appear normal.

Other regions of the brain appeared normal except for a few petechial hæmorrhages clustered in the cerebellar peduncles and in adjacent parts of the pons of both sides.

The main cerebral vessels were healthy.

Microscopic Examination.

Microscopically, the hæmorrhagic lesions so arresting to the naked eye were overshadowed by other changes present over a much wider area of the nervous system; indeed, they existed in large numbers only in and around the areas of most severe damage in the *centrum semi-ovale*. The other changes included œdema, widespread damage to vessels and perivascular tissues, destruction of myelin sheaths, leucocytic infiltration of the nervous parenchyma and proliferation of microglia; the varying severity and combinations of these changes produced many different microscopic pictures.

In parts of the meninges remote from the lesions a few collections of mononuclear and polymorphonuclear leucocytes were present. Similar cells, with a greater proportion of polymorphonuclear cells, occurred in much larger numbers in the meninges overlying areas of severe damage. The most intense polymorphonuclear infiltration was present in the folds of meninges between the pons and cerebellum.

Very lightly affected regions of the *centrum semi-ovale* showed occasional polymorphonuclear leucocytes free in the tissues, while polymorphonuclear cells and lymphocytes occupied the perivascular spaces of the small and larger vessels. Somewhat nearer the more intense lesions, polymorphonuclear cells numbered as many as a dozen in a single high-power field of a section 12μ in thickness; they also formed the majority of the cells present in the perivascular infiltrates. The endothelial or adventitial cells of the small vessels, or both, were often swollen and occasionally undergoing mitosis. In a few places adventitial proliferation was more conspicuous than was leucocytic cuffing; where the perivascular space had, in life, been distended with fluid, these multiplying cells were very obvious. Rarely a few red blood corpuscles were present in the perivascular space.

More severely affected regions of the white matter were œdematous; sometimes homogeneous material coagulated by the fixative lay outside the Virchow-Robin space on one side of a vessel. Polymorphonuclear infiltration of the tissues was more intense, and a number of these cells were karyorrhectic. Around some venules they were concentrated to form zones of extraadventitial infiltration with rather ill-defined margins; the width of these zones was from three to ten times that of the central vessel (Figure II). In many instances lymphocytes, progressively altered microglial cells and phagocytes of adventitial origin were included in the infiltrate; preparations stained by Weil's method showed early breakdown and disappearance of myelin sheaths, and in Bielschowsky preparations some outfall of axis-cylinders was seen. Other focal areas of partial demyelination *et cetera* were not obviously related to a vessel (Figure III). The nuclei of some oligodendroglial cells were pyknotic. In areas thus affected many of the capillaries were stuffed with polymorphonuclear cells. The larger vessels showed changes similar to, but more intense than, those described in the preceding paragraph; these occurred independently of, or in combination with, the extraadventitial changes.

In the most severely affected regions polymorphonuclear cells occurred diffusely in vast numbers (up to 100 in a single high-power field), and accumulated still more densely in foci in the white matter and in perivascular and extraadventitial exudates. The tissues were highly œdematous. The walls of many venules and of a few arterioles were impregnated with fibrin and infiltrated with polymorphonuclear cells; fibrin and leucocytes also distended the perivascular spaces (Figure VI). The whole stained bright orange with Van Gieson's stain and deep pink with eosin. The lumina of these vessels often contained massed polymorphonuclear cells, at times mixed with endothelial cells. The nervous substance immediately surrounding many venules and precapillaries (but seldom arterioles) thus affected, and sometimes that around vessels without fibrin in their walls, also stained bright orange with Van Gieson's stain without showing much obvious fibrin. Sometimes this tinctorial change alone had occurred, but often in addition the neuroglial and oligodendroglial nuclei had faded, leaving a completely acellular zone (Figure IV). As a further development the zone became packed with polymorphonuclear and highly polymorphic microglial cells. For convenience of description, whatever the degree of damage, these zones will be referred to as "perivascular necroses". Usually complete, they sometimes surrounded only a part of the circumference of the vessel; they did not necessarily accompany the vessel to its termination or extend along its tributaries. By Weil's method the myelin sheaths stained very faintly (Figure V), as in recent areas of sudden necrosis (Hurst[2]); with hæmatoxylin and Schariach R stain they were seen to be more or less normal in form, often more so than adjacent sheaths affected by œdema (see below). In Bielschowsky preparations the axis-cylinders appeared no more varicose than were those in the œdematous areas near by. Around these zones the general tissue infiltrate might or might not be accentuated; oligodendroglial and neuroglial cells showed regressive changes, but no considerable outfall. In celloidin blocks examined with a hand lens these rings of perivascular necrosis could be seen readily as pale areas; they were not at all obvious in unembedded material.

In the œdematous areas of the hemisphere, the myelin sheaths were more varicose and showed many more ballonings than in non-affected parts; macroscopically, in Weil preparations, these areas were diffusely pale. The ballooning became extreme when the lesion was most severe in the *centrum semi-ovale*. Here no myelin sheaths of normal form or calibre were seen, and those present stained less intensely by Weil's method. In the gelatinous area mentioned above, empty lacunæ lay between the remaining myelin sheaths. These appearances, probably accounted for largely by the severe œdema *et cetera* (Greenfield[3]), are to be distinguished from the early perivascular and focal demyelination and the perivascular necroses described above; the last two occurred in many regions in which diffuse alterations in the myelin sheaths were either scarcely apparent or non-existent.

Hæmorrhages, which were so conspicuous to the naked eye, were present chiefly in and around the areas of most severe change in the cerebrum, and to a much less extent in the pons and the cerebellar peduncles. A number had an arteriole or venule in the centre, while many were "ball" or minute petechial hæmorrhages not obviously related to a vessel. "Ring" hæmorrhages with a necrotic centre, so typical of brain purpura, were not a feature of this case. The central vessel, when it was present, might show any of the changes previously described; but fibrinous impregnation of the wall of a vessel surrounded by a ring of hæmorrhage was distinctly uncommon. Also hæmorrhages were but rarely associated with zones of pronounced extra-adventitial infiltration. The myelin sheaths running through an area of hæmorrhage were often separated and sometimes broken by the extravasated corpuscles, but many stained normally.

In the white matter of some gyri in the most affected part of the cerebrum, rather different appearances were encountered. Hæmorrhages were numerous, and the outlines of the extravasated corpuscles were better defined than elsewhere. Few polymorphonuclear leucocytes were present except immediately around the vessels and in a few foci in the nervous tissue. In both situations they were associated with many large cells similar to those arising elsewhere from the vascular adventitia, and possibly from the walls of the capillaries. There was no fibrin in the vessel walls. The white matter between the vessels was relatively acellular; many oligodendroglial and neuroglial nuclei were pyknotic or fading, and there had been no proliferation of microglia or infiltration of leucocytes to obscure their disappearance. [In these parts of the brain the lesions bore some resemblance to those in acute epizootic leucoencephalitis of horses (Macallum and Buckley), to which I have made brief reference elsewhere (Hurst[2]). The microglial reaction and that of the vascular adventitia was, however, less advanced, and more polymorphonuclear leucocytes were present in and around the perivascular sheaths.]

Distribution of Lesions.

As stated, lesions were far more widespread than the macroscopic appearances suggested. They occurred over most of the vertical half of the left *centrum semi-ovale*, sparing the extreme frontal and the occipital and temporal regions. They spread through the upper part of the *corpus callosum* to the right hemisphere, where they extended anteriorly and posteriorly in the white matter nearest the vertex and mid-line. They very seldom invaded the cerebral cortex. This was involved only when the underlying white

matter was very severely affected; the cortical lesions then diminished greatly in intensity as the surface of the brain was approached. The basal ganglia were intact. Lesions continued among the cortico-spinal fibres to the mid-brain, where they were especially severe in the *pes pedunculi* and *substantia nigra* of both sides. In the upper part of the pons they covered almost the whole cross-section, but caudally they diminished sharply in intensity, and below the level of the olives no abnormality was detected. Except for the first cervical segment, the spinal cord was not available for examination. From the pons lesions spread by way of the superior and middle cerebellar peduncles into the white matter of the cerebellum. In a few places the molecular and Purkinje cell layers of the cerebellar cortex were the seat of leucocytic infiltration, which appeared to be secondary to the exceptionally intense changes in the membranes between the pons and cerebellum.

In all these regions the main alterations were in the white matter. When, rarely in the cerebral and cerebellar cortex, and often in the brain-stem, nerve cells were included in areas of vascular injury and of tissue infiltration, they showed at most only slight degenerative changes and usually appeared quite normal. In parts of the mid-brain and pons a zone of partial demyelinization occurred immediately beneath the meninges; a similar phenomenon was seen in one place beneath the ependyma of the lateral ventricle.

In a few regions perivascular necrosis occurred in the absence of diffuse infiltration of the tissues with polymorphonuclear leucocytes *et cetera*. The diffusion of parenchymatous lesions obviously depended to some extent upon the disposition of bundles of nerve fibres. In places where intersection of bundles of fibres running in several directions occurred, those running in one direction might be liberally infiltrated with polymorphonuclear cells, while adjacent bundles showing pronounced perivascular necroses might escape diffuse cellular infiltration.

In the brain stem perivascular necroses and areas of partial demyelinization were more often closely adjacent, whereas in the *centrum semi-ovale* the latter tended to occur in areas of less severe damage. In the brain stem, too, there was on the whole less diffuse polymorphonuclear infiltration of the tissues than in areas of correspondingly severe vascular change in the cerebrum. Pronounced œdema was localized to the left cerebral hemisphere.

Other Observations.

Although in the most severely affected areas of the cerebrum some of the vessels were stuffed with polymorphonuclear cells, often mixed with swollen endothelial cells, no definite thrombi were seen.

When the patient's age is considered, the brain was probably not wholly normal at the time of the fatal illness. In many regions, both grossly affected and apparently normal, occasional vessels were surrounded by cells laden with golden pigment; some of this stained with Scharlach R stain, but it contained no demonstrable iron. Numerous "mulberry bodies" in the cortex and elsewhere suggested a mild degenerative process. Finally, a few arterioles showed hyaline degeneration.

The brain was fixed whole in formol-saline solution and no cultural examination was made. No organisms were detected in suitably stained sections.

Case II.

L.D., aged thirty-three years, was a munition worker. A year prior to his fatal illness he sustained an injury to the left side of the head; he did not become unconscious, but subsequently complained of occasional headaches. Three weeks before his last illness he had suffered from the then prevalent "Woodside throat";[4] the attack lasted for about ten days. For some time he had been unduly irritable with his children, but as he was working overtime on the production of munitions this fact is probably not significant. He neither drank nor smoked.

On September 4, 1940, the patient collapsed at his work; he vomited, and after transient recovery he was found lying on the ground, conscious, but capable of only slow speech. After a further period of recovery he walked unsteadily two and a half miles, feeling very ill. At the Royal Adelaide Hospital he was found to have pyrexia, but no other definite sign, and he was advised to return to work next day if he felt sufficiently well. However, next day he could not stand and remained in bed. His wife said that he was "very hot". At night he was sleepless and complained of severe headache.

On September 6, 1940, the man still felt too weak to go to work; in the afternoon he attempted to go out, but had to be undressed and assisted back to bed. He felt generally weak and was "hot and shivering".

On September 7, 1940, after a sleepless night, he reported at the Royal Adelaide Hospital, where again no definite signs were detected. He was advised to return later. He felt very worried and "could not think".

On September 8, 1940, the patient consulted a local practitioner, who could find evidence only of a severe "cold". His wife said that he had no coryza, cough *et cetera*. A certificate of illness was given, but on the way home the man "lost it and forgot all about it". In the evening he mended shoes and did other odd jobs about the house. He slept much better.

On September 9, 1940, he ate a good breakfast and tried to go to work. He was dissuaded by his wife, because he was still "hot" and because he obviously had difficulty in "thinking"—that is, in finding the correct word for a given occasion. Replies to questions were extremely slow, at the rate of about one word each minute. Later in the day he had an epileptic fit and was again seen at the Royal Adelaide Hospital. He was sent home, but on arrival could answer only "yes" or "no" to questions. In the evening he passed into coma, from which he never awakened. He was then admitted to the Royal Adelaide Hospital. His temperature ranged from 97·6° to 99·6° F. during the next few hours. His leucocytes numbered 22,900 per cubic millimetre. No localizing nervous signs were present. Death occurred before midday on September 10, 1940.

Post-Mortem Findings.

At autopsy no abnormality was detected in the abdominal or thoracic viscera.

The left side of the brain was visibly larger than the right. On section the left *centrum semi-ovale* was seen to be swollen, soft and œdematous, with many small hæmorrhages. Except in one place the overlying cortex was normal. The most intense lesions occurred anterior to the lenticular nucleus; they extended transversely across the white matter at a point about equidistant between the vertex and the base, and forward to the frontal pole, where the vertical half of the white matter alone was affected. Similar changes were present also in the *corpus callosum*, but not in the right hemisphere.

Beyond the limits of this grossly affected area the white matter was very œdematous and showed irregular purplish mottling.

The main cerebral vessels appeared normal.

Microscopic Examination.

In this case lesions were so nearly identical with those in Case I that no detailed description is necessary.

Cellular infiltration of the tissues was on the whole rather less intense; relatively more microglial cells and fewer polymorphonuclear cells were present, especially away from the centre of the lesion. Perivascular necroses occurred more frequently in the absence of fibrinous deposits in the vessel walls. Hæmorrhages were more numerous in the most severely affected parts; they did not usually occur around an arteriole or venule, but more often showed the necrotic centre with loss of many myelin sheaths characteristic of classical brain purpura. "Ball" hæmorrhages also occurred frequently.

At one point severe lesions involved the whole thickness of the cerebral cortex, but elsewhere they were confined to the white matter. They extended through the *corpus callosum* to the opposite hemisphere, where, in the absence of macroscopic changes, they spread out in much the same manner as in Case I. They followed the cortico-spinal fibres from the cerebrum to the mid-brain and pons, but were here much less intense than were those in Case I; they affected only the ventral part of the pons and did not spread to the cerebellum. The spinal cord was not available for examination.

As in the preceding case, there were many pigment-containing cells in the perivascular spaces of some vessels in all parts of the cerebellum. Mulberry bodies were fewer than in Case I, but beneath the ependyma of the lateral ventricles *corpora amylacea* were numerous. Both affected and unaffected parts of the white matter of both hemispheres contained numerous spherical masses staining with muci-carmine.

Summary of Clinical and Pathological Features in the Two Cases.

Of each of the cases described, the chief feature was a rapid or rather rapid abrogation of the higher cerebral functions in a previously healthy individual; this was associated with headache, vomiting, slight pyrexia or leucocytosis, or with more than one of these concomitants. At post-mortem examination the subjects presented identical lesions in the brain.

In both cases a highly hæmorrhagic and œdematous state was present, localized chiefly in the white matter of one cerebral hemisphere. Subsequent microscopic examination revealed much more widespread lesions of another kind; these existed independently of, as well as in association with, the hæmorrhages and œdema. They included important damage to the vascular, perivascular and intervascular tissues. There was no clear-cut thrombosis of vessels.

Often the walls of the blood vessels were permeated by and their perivascular spaces distended with fibrin. In the nervous tissue surrounding venules and pre-capillaries, but seldom arterioles, lesions took the form either of partial demyelination with some outfall of axis cylinders, or of changes leading up to necrosis. The association of the former with obviously less severely affected vessels situated at a distance from the most damaged areas, and the frequent relation of the latter to vessels, the seat of heavy deposition of fibrin, suggest that the two appearances represented different degrees of injury by a single noxious agent. A few foci of partial demyelination *et cetera* occurred apparently independently of a vessel. The intense polymorphonuclear infiltration in the perivascular spaces and occurring diffusely in the nervous tissues, together with other features of the cellular reaction, bore witness to the acuteness and severity of the condition.

With few exceptions, in the cerebral hemispheres these alterations were confined to the white matter; in each case they were far more intense on the left side. In Case I the brain stem as far caudally as the pons was heavily involved, as were to a lesser degree the cerebellar peduncles, the white matter of the cerebellum and the cerebellar cortex. In Case II the brain stem was affected much less severely. In regions such as the brain stem, where white and grey matter are intimately mixed, and in the cerebral and cerebellar cortex when these were affected, the nerve cells seldom showed more than minor damage, even when lying in a heavily infiltrated area. These observations recall the findings of an acute demyelinating disease such as post-vaccinal encephalitis rather than in those virus maladies characterized by a polioclastic type of lesion.

The brains of both subjects were received already fixed in formol-saline solution, and no bacteriological examination or animal experiments were possible. No organisms were seen in appropriately stained sections. The presence of enormous numbers of polymorphonuclear leucocytes in the lesions cannot be taken as indicating a bacterial or viral origin. It is well known that leucocytic infiltration occurs in lesions due to a variety of causes, including those in which bacterial infection can certainly be excluded. Recently I have described and commented upon the leucocytic infiltration which may accompany lesions in the central nervous system caused by repeated intramuscular injections of a simple chemical agent, potassium cyanide (Hurst[62]).

Comparison with Certain other Diseases of the Nervous System.

Small hæmorrhages, more or less widespread throughout the brain, are not uncommon in many disease processes. On reference to the literature[1] one is struck by the diversity of morbid states to which, by one author or other, the term "hæmorrhagic encephalitis" has been applied. The case of Rosenfeld,[63] sometimes cited as one of hæmorrhagic encephalitis, was obviously something quite different, for only four tiny petechiæ were found in obviously altered tissue. In the case of Langbein and Oeller,[65] numerous hæmorrhages were found in the optic thalami, chorioid plexuses and *tela chorioidea*; these accompanied extensive venous thrombosis. In a later paper, Oeller[67] described many cases of multiple hæmorrhages in the brain substance associated with sinus thrombosis, meningitis and meningo-encephalitis of bacterial origin, leuchæmia, and fat embolism and other multiple small embolisms. He emphasized the importance of venous or arterial circulatory obstruction in their genesis (see also Spielmeyer[68]).

[1] I have been unable to consult many of the earlier references in German and French journals.

Alpers and Duane[69] and Baker[120] have described multiple hæmorrhages in cases of *purpura hæmorrhagica*. Trauma, with or without fracture of the skull, is a further cause of hæmorrhages widely disseminated through the *centrum semi-ovale* and elsewhere, while Cramer[121] recorded a "typical" case of hæmorrhagic encephalitis in a patient with a medullo-blastoma (and also apparently some pneumonia). Minute hæmorrhages have been described in a number of virus infections. In different conditions the hæmorrhages vary from tiny petechiæ, through "ring" and "ball" hæmorrhages of moderate size, to smaller and larger diffuse extravasations. They also vary in situation, affecting chiefly the grey matter or the white matter, or both. From this heterogeneous assortment two fairly well defined groups of cases have been separated on the clinical history or on pathological examination, or on both.

Brain Purpura.

Brain purpura (Schmidt[122]), one form of so-called hæmorrhagic encephalitis, occurs in a great variety of diseases, and except possibly in typhus, affects principally the white matter of the cerebrum and cerebellum. "Ring" hæmorrhages are particularly characteristic of this condition. A vessel, usually a precapillary, suffers destruction of its endothelium; often a hyaline or fibrin thrombus occupies its lumen, though this is by no means invariably the case (Alpers[123]). Around this vessel lie typically a zone of coagulative necrosis permeated by fibrin, a ring of proliferated glial elements (which Alpers holds are exclusively oligodendroglial), and finally one of extravasated red blood corpuscles. Writers disagree as to whether or not myelin sheaths can be demonstrated in the central area, but no primary or secondary products of their degeneration are seen (Spielmeyer). "Ball" hæmorrhages also occur, and, probably incorrectly, have been considered by some (Schmidt) as early forms of the "ring" hæmorrhages. There is a remarkable identity of the lesions in the most varied conditions—pneumonia and other infections, "Salvarsan" encephalopathy, pernicious anæmia, burns, war gas poisoning, chronic nephritis, and so on. On occasion extravasated red blood corpuscles may be absent (Schmidt, Spielmeyer, Alpers *et cetera*), in which case a palisade of glia surrounds the necrotic centre. It seems that hæmorrhages are a more or less fortuitous sequel to the vascular lesions; Dietrich[124] believes that they result only when the local damage to small vessels is combined with local or general circulatory disturbance. In pure cases the condition is non-inflammatory (Spielmeyer), so that the term hæmorrhagic encephalitis is hardly warranted.

Hæmorrhagic Encephalitis.

The second condition is the hæmorrhagic encephalitis recently described by Baker.[120] Under this name he described 20 cases, collected in Minnesota over a period of fifteen years, in which a primary hæmorrhagic disease of the brain was not associated with any other pathological condition. Usually under twenty-five years of age, his patients suddenly developed headache, lassitude and pyrexia, and occasionally nausea and vomiting. Some became unconscious almost at once and died within a few hours; others, surviving for a few days or a few weeks, passed through a period of clouding of the sensorium; they became dazed and confused and finally comatose. No evident relation existed between the height of the temperature and the period of survival; patients with temperatures of 106° or 108° F. lived for days, while others with moderate pyrexia died in a few hours. Convulsions were frequent, as were spasticity of the extremities and disturbances of the reflexes. These signs varied strikingly from day to day and even from hour to hour. A moderate leucocytosis was found in six of eight cases. In four of 12 cases the cerebro-spinal fluid was slightly blood-tinged, in five it was under slightly increased pressure, and in seven it contained from 10 to 560 cells per cubic millimetre, many of which were polymorphonuclear leucocytes.

The lesions in Baker's cases were confined chiefly to the white matter. Hæmorrhages varied in size from minute petechiæ to massive extravasations bursting into the cortex

in cases of some duration. The larger hæmorrhages probably resulted from coalescence of the smaller. "Ball", "ring" and diffuse hæmorrhages all were seen; the description and illustrations suggest that the "ring" hæmorrhages differed in detail from those in brain purpura. In the cases of subjects who survived for some days, perivascular non-hæmorrhagic demyelinating lesions were noted around some vessels. No consistent specific changes were noted in the nerve cells. A few widely scattered polymorphonuclear leucocytes could be detected in the areas of degeneration. Baker discussed the differential diagnosis and concluded that hæmorrhagic encephalitis was a definite entity.

Discussion.

When the lesions in my cases are compared with the foregoing, it is seen that in Case II the hæmorrhages frequently resembled those typical of brain purpura, while in Case I they occurred more often around larger vessels or were "ball" hæmorrhages without necrotic centres. Other features of my cases served to distinguish them from both brain purpura and Baker's hæmorrhagic encephalitis.

Brain purpura develops in the course of some severe and easily recognized toxic or infectious process. In my cases, as in those of Baker, symptoms of nervous disorder appeared suddenly, or rather suddenly, in apparently healthy individuals, and neither clinically nor at autopsy were these found to be suffering from any other disease. In brain purpura it is admitted that the essential lesions are the injury to precapillaries and the ensuing perivascular necrosis; hæmorrhages are a spectacular but purely fortuitous result of this damage. In my cases, too, it was obvious that hæmorrhages were more or less fortuitous and restricted to the regions most severely affected. The perivascular necroses, however, surrounded not only precapillaries but also venules and larger veins, and even arterioles; these larger vessels often showed marked inflammation of their walls. Finally, the partial demyelination and massive infiltration of the tissues with polymorphonuclear leucocytes *et cetera*, existing in my cases, constitute no part of the accepted pathological picture of brain purpura.

Though more nearly resembling Baker's hæmorrhagic encephalitis, the findings in my cases did not correspond exactly with those described in his paper. Baker observed that perivascular demyelination occurred independently of hæmorrhages in patients who survived for several days after the onset of symptoms. In my first case, in which death occurred within forty-two hours of the onset, perivascular and focal demyelination, though incomplete, were already clearly marked, and were no doubt of the same duration as the other lesions. The perivascular necrosis in my cases and the pronounced infiltration with polymorphonuclear cells *et cetera*, had no parallels in Baker's cases; at most he found a few scattered polymorphonuclear cells in the areas of degeneration.

I have already stated that in my cases the distribution of the areas of demyelination on the one hand, and of the more severe vascular damage with perivascular necrosis on the other, suggested that demyelination represented the response of the tissues to a less serious insult by whatever agency caused the vascular injury. Since it is clear that hæmorrhage is a common sequel to vascular injury of this nature, it may perhaps be inferred that some forms of hæmorrhagic encephalitis and some types of demyelinating disease may result from the same noxious agency acting in different intensity and over a shorter or a longer period. This inference is supported both by the findings in Baker's and in my cases and by certain observations made by Russell.

Russell[(18)] examined three cases of encephalopathy occurring in the course of medication with arsphenamine, which is well known as a cause of brain purpura. In each lesions were conspicuous in the white matter. In one they were predominantly hæmorrhagic; only very careful examination detected a few narrow perivascular necroses, some early degeneration of myelin sheaths near vessels of the *corpus callosum*, and a few ill-defined foci in which degeneration of myelin sheaths and axis-cylinders was in progress in the spinal cord. In the second case the perivascular necroses and areas of demyelination were much more evident. In the third case, lesions consisted almost exclusively of zones of perivascular demyelination not wholly dissimilar from those in the encephalomyelitis following vaccination, smallpox and measles. In one or other of these cases are recorded all the appearances I have described, except the massive, diffuse polymorphonuclear and microglial response and the small focal areas of demyelination.

It may be interpolated here that although I had no reason to suspect arsenic as a causative agent in my cases, Mr. C. E. Chapman, Director of the South Australian Government Department of Chemistry, kindly examined from this point of view both brains and the formol-saline solution in which they had been suspended. No arsenic was detected.

Proof of the tentative hypothesis of the essential identity of some forms of hæmorrhagic encephalitis with some types of demyelinating disease must obviously await more precise knowledge of the ætiology of the various conditions. Immediate reaction to it will depend largely on individual tendency either to discern wherever possible resemblances between different manifestations of disease, or minutely to subdivide pathological conditions on the basis of possibly non-significant differences. Ferraro[(19)] has already uttered a warning against the latter tendency in the case of the demyelinating diseases. For myself, at the moment, I prefer to see in Baker's and Russell's cases, and in my own, links which may possibly connect two apparently dissimilar conditions. The name under which I have described these supposed links, "acute hæmorrhagic leucoencephalitis", suggests at once the clinical features of the cases, the macroscopic findings, the predominant localization of lesions in the white matter of the brain, the occurrence of demyelination as part of the pathological picture, and the implied relation to other demyelinating diseases.

In conclusion, brief comment may be made on the distribution of lesions in the cerebral hemisphere. It is, of course, well recognized that in Schilder's encephalitis, the encephalopathy due to poisoning with potassium cyanide, cerebral œdema, and some other pathological conditions, the U-fibres tend to escape injury when those deeper in the *centrum semi-ovale* are severely affected; in other words, they appear to exhibit remarkable resistance to attack (see Wertham and Wertham[(17)]). In the cases described in the present paper also, these fibres were largely intact; but it cannot be supposed that their escape from damage was determined by greater resistance. Rather would it seem that they escaped because the vascular injury on which other lesions apparently depended affected only the vessels of the deeper white matter. What factors are responsible for the localization of vascular injury to these particular vessels are at present wholly obscure and difficult to envisage.

Summary.

The name "acute hæmorrhagic leucoencephalitis" is here given to an acute nervous disease characterized by severe damage to the walls of blood vessels, perivascular necroses, perivascular and focal demyelination, intense polymorphonuclear exudation and microglial reaction. Where lesions are most severe, œdema and hæmorrhages are conspicuous. In the cerebrum the lesions are confined almost exclusively to the white matter. Clinically, the chief feature is a rapid or rather rapid abrogation of the higher cerebral functions in a previously healthy individual; this is associated with headache, vomiting, slight pyrexia or leucocytosis.

The lesions in two cases are compared with those in brain purpura and in Baker's hæmorrhagic encephalitis. It is suggested that acute hæmorrhagic leucoencephalitis may represent a link between the demyelinating diseases on the one hand and some forms of "hæmorrhagic encephalitis" on the other.

Addendum.

The symptoms in the following case may have been due to a rapidly growing cerebral tumour or to some other morbid condition. In view of the clinical history, however,

it seems that a leucoencephalitis rather less acute than that in the cases described above should be considered in the differential diagnosis. It may have been purely coincidental that this patient, like the two others described in this paper, gave a history of an acute respiratory infection within three weeks to three months of the fatal illness.

H.R., aged thirty-seven years, was an accountant. For some years he had presented himself for medical examination at regular intervals. He suffered from constipation and, when working overtime, was apt to complain of indigestion. About seven weeks before his death he suffered a severe attack of the then prevalent "Woodside throat"; from this he recovered within a week or so.

On September 10, 1940, he consulted his doctor on account of severe headaches, "on the top of the head"; these occurred especially in the early morning. On September 14, 1940, he went to a seaside resort for a holiday. During the first week he was apparently quite well, except that he was slow in eating his meals, which he often allowed to become cold. During the second week of the holiday he became indecisive and abnormally slow in all his activities; he required sustained persuasion to eat or to dress or to prepare for an outing. He complained repeatedly of headaches. He could still drive his motor car. He was brought back to Adelaide on September 29, 1940, and was admitted to hospital next day.

On his admission the patient was drowsy but could easily be aroused to normal animation. He complained of headache on the top of the head. His leucocytes numbered 11,500 per cubic millimetre, 55% being polymorphonuclear cells.

On October 3, 1940, he was still drowsy and apathetic. At meals, unless continually urged by the nurse, he would go to sleep with food in his mouth. He could, however, be aroused, and when examined by a consultant he walked the whole length of the room and discussed his illness quite rationally. His reflexes were normal.

On October 4, 1940, he was more lethargic and had poor control of the sphincters. Lumbar puncture next day yielded a clear fluid under no great pressure and containing no excess of cells.

On October 6, 1940, he would reply to questions only in monosyllables. All control of sphincters had been lost. He died rather suddenly on October 7, 1940. Autopsy was refused.

ACKNOWLEDGEMENTS.

I am indebted to Dr. R. A. Haste, Dr. A. R. Southwood and Dr. F. B. Turner for information concerning these cases, and to Dr. H. Kenneth Fry for permission to publish the clinical notes of one of them. The post-mortem examinations were performed by Dr. J. B. Thiersch and Professor J. B. Cleland respectively; in the two cases discussed they have placed freely at my disposal their pathological material. To Mr. C. E. Chapman I am indebted for the analyses for arsenic.

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PYELOGRAPHY AFTER THE SUBCUTANEOUS INJECTION OF DYE.

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SINCE Lichtenberg and Swicht, in 1925, elaborated the successful development of urography by the intravenous injection of solutions, a percentage of the investigations on the urinary tract have been undertaken by this means. It is of considerable value in the examination of patients who are unable to be submitted to cystoscopy owing to poor general condition, badly infected bladders, bladder-neck obstruction or urethral strictures. It is a simple method of determining the normality of the upper portion of the urinary tract in such cases in which one would assume from the history and clinical findings that a disease process in this region is unlikely to be present.

The solutions used contain a high percentage of iodine, which, being excreted through the kidneys, renders the collecting portions opaque. If suitable treatment is given prior to the injection, and if the ureters are compressed during the taking of the pictures, the radiographs obtained compare favourably in density with those obtained by means of retrograde pyelography. The procedure has the further advantage of being a physiological method, and the results are not affected by any manipulations, as occurs in the retrograde method.

Owing to the small size of the veins in children and some patients, mainly women, intravenous injection may provide great difficulty, and it is customary under such conditions to expose the vein by incision over it before injection. To avoid this, attempts have been made to exploit other routes of introduction of the drug—namely, by the mouth, subcutaneously or intramuscularly. The first of these methods has not proved satisfactory, owing no doubt to the rapid oxidation of the drug in the alimentary canal or to failure of absorption.

A method of pyelography by means of intramuscular injection of the drug has been reported by Popma; in this method undiluted dye is injected into the muscles of the buttock and results in successful visualization of the urinary tract.

Perivenous extravasation during intravenous injection leads to complaint of great pain and often to sloughing, and this fear of severe tissue reaction has delayed attempts at pyelography by means of subcutaneous injection of dye. However, dilution of the drug has been found to eliminate this danger, and in well prepared patients of slight weight, satisfactory filling of the pelvis and calyces of the kidneys, the ureters and bladder may be seen.

The technique used consists in the preparation of the patient by an aperient given at least thirty-six hours before injection. The patient is starved from food and fluid from midnight on the day of injection. A preliminary film is taken, and should this be obscured by gas, attempts at clearing the intestine are made by means of enemata.

Twenty cubic centimetres of the solution to be used are diluted by the addition of 80 cubic centimetres of saline solution. The site of the injection is either the scapular region or the axillæ, the skin being prepared with iodine. Two wheals are made on either side, a 1% solution of "Novocain" being used. Long needles are introduced into the loose subcutaneous tissues in either region, and 50 cubic centimetres of solution are slowly injected on either side. Exposures are made in ten minutes, twenty minutes, and as required subsequently, according to the rapidity of excretion.

Slight complaint of pain may be made during injection, owing probably to the bulk rather than to the irritative nature of the fluid used; but no reaction apart from this has been noted. To obviate this discomfort, particularly in adults, two cubic centimetres of a 2% solution of "Novocain" without adrenalin may be added to the solution.

The radiographs shown (Figures I, II and III) are those taken at ten minutes, forty-five minutes and sixty-five minutes after subcutaneous injections of "Perabrodil" solution in a child, aged five years. Excretion will be noted even in the first picture, and the filling and its density at the later times are excellent.

Acknowledgement.

The radiological cooperation of Dr. John O'Sullivan is gratefully acknowledged.

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Reports of Cases.

HYDATIDIFORM MOLE AND CHORIONEPITHELIOMA: A REPORT OF TWO CASES.

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THE instructive article by Dr. W. G. Cuscaden and Dr. H. F. Bettinger on "The Significance of the Aschheim-Zondek Test in the Early Diagnosis of Chorionepithelioma" [1] in this journal of October 19 prompts me to report one case each of hydatidiform mole and of chorionepithelioma following hydatidiform mole.

Although the events recorded took place six years ago, each case presents features of interest in diagnosis, treatment and the employment of the Aschheim-Zondek test.

Case I.

Clinical Record.

P.O., aged twenty-three years, had one child, aged two years. She was admitted to hospital on September 27, 1934. Her menses had been normal and regular until her last menstrual period on July 5, 1934. One month later she began to lose a small amount of blood *per vaginam*, and this loss continued almost daily. The hæmorrhage had become more profuse and the discharge brighter in colour for two weeks prior to her admission to hospital. For three weeks morning sickness had been severe.

Examination revealed a sallow woman with a pulse rate of 108 per minute. Her tongue was furred, her eyes were sunken. Her blood pressure and temperature were normal. The uterus was enlarged to the size of a sixteen weeks' pregnancy. Fœtal parts and fœtal heart sounds were not detected. There was a little brown vaginal discharge. On October 3, 1934, the uterus was of the size of a twenty weeks' pregnancy, and in an X-ray film no fœtal parts were seen. On October 8 the Aschheim-Zondek test produced a positive reaction in dilutions up to 1 in 50.

On October 13 the uterus was of the size of a twenty-six weeks' pregnancy and the patient was suffering from frontal headache and vomiting. The blood pressure was normal and the urine was clear. On October 17 the uterus was of the size of a twenty-eight weeks' pregnancy, and still no fœtal parts were shown in an X-ray film. The urea concentration test gave results slightly below normal.

On October 18 abdominal hysterotomy was performed under spinal anæsthesia with "Neocaine". Hydatidiform mole in a large quantity (48 ounces) was removed from the uterus, the vesicles varying in size from a wheat grain to a cherry. Débris and fibrin covered the endometrial surface, and their removal required blunt curettage. A uniformly clean endometrial surface remained, without macroscopic evidence of muscular invasion. The uterus contracted readily and was closed in the usual manner. The right ovary was polycystic and of the size of a pullet's egg. The left ovary and both Fallopian tubes appeared normal. Lentil-sized yellowish areas, like lutein tissue, were scattered at intervals over the ovaries and posterior layers of the broad ligaments.

Microscopic examination of the removed material revealed typical hydatidiform mole, with proliferation of both syncytial and Langhans's layers, and œdematous degeneration of the villous stroma. There was no evidence of malignancy.

Convalescence was uneventful. On November 6 the patient was discharged from hospital. The urea concentration test then gave normal results. On November 20 a follow-up examination revealed no abnormality. The uterus was well involuted and the cervix was closed.

On March 28, 1935, the patient had gained one stone in weight and was in excellent health. Complete examination revealed no abnormality. The Aschheim-Zondek test produced negative results.

Discussion.

The chief interest of this case is in the method of treatment. The advantages of abdominal hysterotomy when the uterus is larger than that of a twelve weeks' pregnancy are as follows: (i) Complete removal of the whole of the hydatidiform elements is possible under direct vision. (ii) Macroscopic evidence of invasion or otherwise of the uterine muscle is available, allowing of immediate hysterectomy if indicated. (iii) Accidental perforation of the uterus is eliminated and hæmorrhage is controllable.

In 1928 Brooke Bland[2] reported the histories of four patients with hydatidiform mole treated by dilatation and curettage at the Jefferson Medical College Hospital, with two deaths. Both women succumbed to hæmorrhage within a few hours of interference from below.

Case II.

Clinical Record.

I.C., aged thirty-six years, had had five normal confinements, the last two years before. She was admitted to hospital on September 28, 1934. Her last normal menstrual period had occurred on August 14, 1934. Ten days later she had two bouts of vaginal hæmorrhage. Her doctor found the uterus enlarged to the size of a twelve weeks' pregnancy, and ordered rest in bed. Several days later free vaginal hæmorrhage occurred, and a hydatidiform mole was expelled "with large masses of grape-like bodies". Her doctor, who was experienced in gynæcology, then curetted the uterus and was convinced at the conclusion of the operation that the uterine cavity was clean. After one week in hospital the patient returned home.

One week later free vaginal hæmorrhage occurred, followed by smaller hæmorrhages over some days. On the day of her admission to hospital vaginal hæmorrhage had recommenced.

Examination revealed an anæmic spare woman. Her pulse rate was 124 per minute, her systolic blood pressure 124 and diastolic pressure 80 millimetres of mercury, and her temperature 97·2° F. The uterus was enlarged to the size of a ten weeks' pregnancy and the cervix was closed. There was a small amount of blood in the vagina. A freely mobile cystic swelling, the size of a lemon, occupied the right fornix.

On September 29 curettage was performed. Old blood clot and small amounts of débris and endometrium were removed. There was little hæmorrhage and the uterine cavity could be scraped cleanly. The pathologist's report read: "Sections suggest a hydatidiform degeneration of chorionic villi."

On October 2 the Aschheim-Zondek test gave a positive result with undiluted urine; owing to a staff error it was not carried out with dilutions of 1 in 50 and 1 in 100. On October 8 a severe vaginal hæmorrhage was arrested by plugging. On October 12 the blood urea level was normal

and urea concentration tests gave normal results. After October 14 small hæmorrhages from the vagina occurred each day. The uterus was anteverted, almost of the size of an eight weeks' pregnancy, and the cervix was slightly open. The cyst in the right fornix was unchanged. On October 17 a severe hæmorrhage again necessitated plugging of the vagina. The patient's hæmoglobin value was 40% (Sahli) and her bleeding time 2·5 minutes.

On October 19, under spinal anæsthesia with "Neocaine", abdominal panhysterectomy and double salpingo-oophorectomy were performed. A blood transfusion of 20 ounces was given during the operation.

The removed uterus measured 4·5 inches in length and 3·5 inches in width. The uterine cavity was 3·9 inches long, and its upper half was occupied by a mass two inches in length and 0·7 inch in width, projecting from the posterior wall (Figure I). After sagittal bisection of the uterus and mass the latter was seen to measure 1·4 inches in length at its base of attachment to the uterus and 1·5 inches in depth, of which 0·6 inch invaded the uterine musculature

FIGURE I.

Photograph of the specimen of uterus in Case II. The projection of the tumour into the cavity of the uterus is shown. The invasion of the wall is only slightly apparent.

(Figure II). The tumour had an appearance of trabeculation and showed three longitudinal zones: a compact blue-grey zone of invasion with some mottled areas of hæmorrhage, a clearer central zone with small cystic spaces and attached vesicular elements, and a superficial zone of adherent blood clot. The endometrium of the remainder of the uterus and cervix, the epithelium of the *portio vaginalis* and the peritoneal coat appeared normal.

Microscopic examination of the uterine growth revealed the typical elements of chorionepithelioma, with sheets of Langhans's cells and large syncytial masses in disorderly arrangement. The Langhans's cells were in preponderance, and in several mitotic figures were seen (Figures III and IV). There was extensive infiltration of the muscle, with negligible reaction. In a portion of one section a few villous formations persisted, all with extensive œdematous degeneration of the stroma, but only some with proliferation of the epithelial lining.

The right ovary was represented by a multilocular cyst 3·5 inches in length and 2·3 inches in width (Figure V). Neither the olive-sized plug of recognizable ovarian tissue nor the walls of the cysts contained lutein tissue. The left ovary, the Fallopian tubes and the broad ligaments appeared normal.

The early convalescence was uneventful. On October 31 the Aschheim-Zondek test gave a positive result with undiluted urine and a negative result with urine diluted 1 in 50. On November 7 the patient sat out of bed. On November 13 a course of deep X-ray therapy to the lower portion of the abdomen and the pelvis was begun. On December 4 the course of deep X-ray therapy was almost completed, and the patient felt and looked extremely well. But vaginal examination now revealed a cystic swelling, 2·5 inches in length and half that width, bulging the right vaginal wall near the introitus and revealing the blue tinge

FIGURE II.

Photograph of uterus and tumour after gross section, demonstrating the invasion of the wall.

of underlying blood when the vaginal mucosa was stretched. Twenty-five cubic centimetres of red blood were aspirated from the swelling. Attempts at culture were without result, and carcinoma cells were not detected in smears.

On December 12 a severe vaginal hæmorrhage was arrested by plugging. On December 13 twelve radon needles were interstitially implanted into the vaginal metastasis by Dr.

FIGURE V.

Photograph of right ovary after gross section, showing multiple large cysts.

W. G. Cuscaden. These were removed in eight days; this represents a dosage of 60 millicuries. Pyobacilluria and low pyrexia complicated convalescence for the next four weeks.

On January 8, 1935, radiological examination of the lungs revealed no abnormality. On January 23, 1935, the patient was discharged from hospital. A fine scar, one inch in length, replaced the vaginal metastasis.

On March 28 the patient was in excellent health. Her hæmoglobin value was 80% (Sahli) and clinical examination revealed no abnormality. The lungs were radiologically clear. The vaginal scar was almost impalpable. The Aschheim-Zondek test gave negative results. In October, 1940, the patient's doctor wrote that she was working hard in the home and that her health had "never been better".

Discussion.

This case is of interest in its characteristic clinical course and in the favourable outcome.

Vaginal metastasis of uterine chorionepithelioma is not uncommon and usually adds to its gravity. Alan Brews,[3] in his recent review of the subject, found that of 24 patients suffering from chorionepithelioma, 14 had died, and seven of these had had vaginal metastases. In addition, a vaginal metastasis was present in one patient who survived; it underwent spontaneous resolution after hysterectomy.

The case here reported differs from those reported by Brews in that the vaginal metastasis first became evident some weeks after the removal of the primary growth and almost at the completion of a course of deep X-ray therapy.

Acknowledgement.

I wish to thank Mr. E. S. J. King and Dr. H. F. Bettinger for the photographs.

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ACUTE SUPPURATIVE OTITIS MEDIA AND MASTOIDITIS WITH SEVERE HÆMORRHAGE FROM THE EAR: PRESUMED EROSION OF THE INTERNAL CAROTID ARTERY, LIGATION OF INTERNAL, EXTERNAL AND COMMON CAROTID ARTERIES.

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SEVERE bleeding from the external auditory meatus of an extent sufficient to endanger life is an uncommon occurrence. The operation of ligation of the internal carotid artery to check dangerous external bleeding, not resulting from a wound, is an unusual procedure. The combination of both events in this case here described in detail makes it worthy of record.

Clinical History.

J.C., a female patient, aged five and a half years, was admitted to hospital on July 16, 1939, on account of severe hæmorrhage from the left ear. The previous history as given by the child's parents is as follows.

On June 18, 1939, Dr. Wawn was called in and he prescribed a medicine and a few days' rest for a cough. He said that the condition was not bronchitis. On June 25 he forecast measles, which developed three days later. On June 30 the right ear ached and discharged. The usual routine of vomiting, delirium, constipation *et cetera* was over by July 8, but the child remained very ill, with a high temperature and periodical vomiting.

Dr. Wawn was called again on July 12, as she seemed very dull and listless. He examined both ears. but could not detect any trouble, and said that developments had to be awaited; but on July 14 she suffered a shivering attack and complained of aching in the left ear. Dr. Wawn later examined the left ear and found it to be inflamed. He ordered drops and fomentations.

On Saturday, July 15, the child cried throughout the day with earache and insisted on keeping her head in a reclining position over the left shoulder, as if to relieve a weight. She had very little sleep on Saturday night; she had a temperature of 104° F. Aspirin was given.

On Sunday, July 16, the ear was becoming steadily worse. Dr. Wawn was scheduled to arrive at 10.30 a.m., but at 10.15 a.m. blood suddenly flowed freely from the ear. Crushed ice was applied in a towel to the ear, and after the loss of almost one and a half pints the bleeding ceased and Dr. Wawn arrived. He immediately arranged for her removal to Saint Benedict's Hospital and I was called to see the patient.

She had not complained of trouble in the left ear until three days before the hæmorrhage occurred; but she was a very sick child for fourteen days previously, being unable to use her bowels. and she was vomiting. Her temperature was also high. She was very listless and just wanted to lie still with her eyes closed.

During this time her sister, aged four years and three months, and her father also contracted measles. Both ear drums of the sister were punctured and drainage was allowed to occur for three weeks. The father developed an abscess on the lower lid of the right eye, which was lanced and drained successfully.

The child's temperature was 104° F., her pulse rate was 136, and her respirations numbered 20 in the minute. She was very pale and restless, apparently from the great loss of blood.

The left external auditory canal and meatus were filled with blood clot and blood was oozing through. The walls of the canal were very swollen. It was not possible to examine the drum or middle ear on account of the clot and swollen condition of the tissues of the canal. One felt that interference in this direction would very likely cause a recurrence of severe hæmorrhage. There was no swelling over the mastoid process, though some tenderness was elicited on pressure. A distinct swelling about the size of a small egg was present on the left side of the neck, extending downwards from just below the tip of the mastoid for a distance of one and a half inches. The swelling felt firm and, though tender, was non-fluctuant. It did not feel like an abscess (Bezold's) nor enlarged cervical glands.

The right ear was discharging pus through a perforation of the drum from an acute suppurative *otitis media*. No complication was apparent.

The tonsils had been removed and no abnormality was detected in the nose.

Her general condition was very poor, and as the hæmorrhage appeared to be lessening I decided to leave her alone, simply prescribing morphine, blood coagulants and ice bag. Some "M & B 693" tablets were also ordered.

The daily progress was as follows.

On July 16, 1939, the day of admission to hospital, the child's temperature was 105° F., the pulse rate was 140 in the minute and the respiratory rate 32. She was vomiting bile. Slight oozing took place from the left ear. There was a purulent discharge from the right ear. The left side of the neck was swollen and tender to touch.

On July 17, 1939, the temperature was 103° F., the pulse rate was 140 and the respiratory rate 28 in the minute. The patient had had a fairly good night. She was vomiting at times. Tenderness was increased over the left mastoid. The left ear was draining very freely, the discharge being stained with old blood; no fresh blood was present.

On July 18, 1939, the temperature was 100·8° F., the pulse rate was 138 and the respiratory rate 22. There was a slight blood-stained ooze from the left ear. The hæmoglobin value was 40%; a blood transfusion was given, the mother being the donor. Saline solution was also given intravenously.

On July 19, 1939, the temperature was 98·4° F., the pulse rate was 90 and the respiratory rate 22. According to the night report, the patient was very drowsy. The left eye was inflamed; the pupils were unequal. The child had slept for seven hours. The left ear was oozing with a purulent and serous blood-stained discharge. According to the day report, the child slept and had a comfortable day. There was no hæmorrhage or vomiting, and the pulse and colour improved.

On July 20, 1939, bright blood commenced to flow from the left ear and continued off and on intermittently, so I decided to operate. Up till now, since her admission to hospital, there had been no extensive fresh bleeding from the ear, and I felt that the blood coagulants (hæmostatic serum and "Clauden") had helped to check the hæmorrhage. The blood transfusions and intravenous saline solution injections had greatly improved the child's general condition. The "M & B 693" tablets may have helped. However, it was now clear that any further waiting was unjustifiable. At midday the temperature was 97·8° F., the pulse rate was 88 and the respiratory rate 22.

The First Operation.

Ether anæsthesia was administered by Dr. Clive Disher, who used the intratracheal method. The usual post-auricular mastoid incision was made and the pinna was reflected well forwards. The external auditory canal was opened pos-

teriorly and much blood clot was removed down to the drum. The walls of the canal were very swollen. On anterior exploration a sinus was found coming through the membranous wall of the external auditory canal. This was filled with blood clot and fresh blood was flowing from it. Blood clot was also present in the region of the drum and the middle ear; blood was coming from this site also. The bleeding became very profuse and was controlled by tight packing of the sinus leading anteriorly from the canal wall, and also by packing of the bony external auditory canal.

The mastoid antrum and cells were now opened and pus was evacuated. There was no connexion between the infected mastoid and the cervical swelling, that is, there was no Bezold's abscess. It was apparent that the swelling was blood clot which was not infected; it was therefore left alone. The mastoid wound was packed with "B.I.P.P." The pinna was stitched forward to the face and the wound was left open. The patient was returned to the ward.

On the evening of the same day the temperature was 97·8° F. and the pulse rate was 88. The child was coughing a lot at night.

On July 21, 1939, the temperature was 102·4° F., the pulse rate was 120. The child was very restless. Speech was very slurred and indistinct. Examination revealed a large left peritonsillar (fossa) swelling. The child complained of left earache.

On July 22, 1939, the temperature was 102° F., the pulse rate was 92. The patient was irritable and restless. Bright blood came from the mouth, about eight ounces in quantity. The swelling in the pharynx had ruptured at a spot in the soft palate above the left tonsillar fossa. Blood and blood clot flowed through.

On July 23, 1939, the patient's temperature was 105·4° F. and the pulse rate was 100 in the minute. A transfusion of blood was given. More hæmorrhage occurred from the mouth and also from the left ear. Marked swelling of the left tonsillar fossa and soft palate was present. The patient had very little space for breathing. She vomited blood and her hæmoglobin value was 55%.

The Second Operation.

On the same day, July 23, 1939, the second operation was performed, ligation of the left common, internal and external carotid arteries being carried out by Mr. W. D. Upjohn. Dr. Guy Springthorpe administered the anæsthetic.

At the start difficulty in breathing occurred on account of the swelling of the oro-pharynx. Not until I had introduced my finger into the child's mouth, down to the glosso-epiglottic fossæ and pressed the base of the tongue forwards, thus establishing an airway, was it possible to go on with the induction of anæsthesia. A small pharyngeal rubber airway was put into the mouth and anæsthesia was maintained by blowing ether through the tube by means of a Shipway apparatus. As bleeding into the mouth continued, a sucker had to be kept going all the time. Blood transfusion was carried out by Dr. Ian Wood prior to, during and after the operation.

Mr. Upjohn has kindly written the following comments on the case and a description of his operation.

> When seen on the morning of July 23, 1939, the child was very white and sweating and in obvious discomfort. A slow trickle of pale blood was issuing from the external auditory meatus and her breathing was noisy, as if impeded by some pharyngeal swelling.
>
> A blood transfusion was commenced by Dr. Ian Wood and her appearance gradually improved. Within an hour, however, the trickle of blood from the ear had increased in volume and rate of flow, so operation was undertaken with as little delay as possible.
>
> The operation of exposure of the carotid vessels in the carotid triangle is usually an easy one, but circumstances made it difficult in this case. The small space available owing to the short length of the child's neck, the proximity of an infected wound, the presence of œdematous inflamed cervical lymph glands, the crowding of the working space by anæsthetist, transfusors, operator, and the necessity for Dr. Eadie to keep his fingers pressing on the base of the tongue to maintain an airway, all contributed to making the operation troublesome.
>
> When the common carotid was exposed at its bifurcation a catgut thread passed under the common carotid and pulled so as to kink it, caused the free bleeding to subside immediately to a comparatively small trickle. On its release the bleeding returned to its former volume. Kinking the external carotid artery had no effect on checking the blood flow from the ear. Kinking the internal carotid artery reduced the blood flow to a very small amount. Accordingly, the internal carotid was firmly ligated by a catgut ligature. The common carotid artery was loosely occluded by a catgut thread and the external carotid artery was ligated at the site of election.
>
> It was thought advisable to tie the external carotid and to occlude the common carotid loosely so as to diminish the risk later of an erosion of the internal carotid at the site of ligature, for the field of operation was judged to be infected from its close proximity to the septic operation wound over the mastoid region.
>
> Before closure of the wound in the neck some bismuth iodoform paraffin paste was smeared over the raw surfaces and the excess of paste was wiped away. The bright arterial bleeding had now ceased, but there was still some dark venous bleeding of small amount coming from the deeper part of the first operation wound. This was stopped by packing with a small amount of gauze. No troublesome bleeding returned after this. Her pupils became unequal, but there was no disturbance of vision or any signs of interference with cerebral function.

After Mr. Upjohn had completed his operation I removed the packing from the external auditory canal and the anterior sinus. There was a great deal of blood clot present and dark blood oozed up from the sinus. With a blunt curette more blood clot was removed and the bleeding became more profuse; this was controlled by introducing a finger down the sinus, anteriorly, inferiorly and medially, for a distance of about two inches. The cavity was then packed with "Clauden" ribbon gauze and firm pressure was applied by suturing the skin over the packing. The patient was returned to the ward. Her colour was good and her pulse rate 108 in the minute. "Carbogen" and intravenous injections of saline solution were given during the night.

On July 24, 1939, the patient's temperature was 101° F. and her pulse rate 124. She was noisy and restless, and she had a bad cough with blood-stained mucus. Her pupils were unequal. No bleeding was present. Two cubic centimetres of "Clauden" were given.

On July 25, 1939, the patient's temperature was 102·8° F. and her pulse rate 120. She was very restless and noisy. Her pupils were very unequal. She complained of pain in the right ear; examination showed that the middle ear was discharging.

On July 26, 1939, the patient's temperature was 102·8° F. and her pulse rate was 80 in the minute and irregular. She was restless and irrational at times. She coughed several times in her sleep. Mr. Upjohn dressed the neck wound, which had suppurated, and removed the Mikel clips.

On July 27, 1939, the patient's temperature, taken in the axilla, was 103·8° F., the pulse rate was 142 and the respiratory rate 30. She was very restless and complained of abdominal pain. The right ear was "quiet", though suppurating. She complained of pain in the left ear.

On July 28, 1939, the patient's temperature was 97° F., the pulse rate was 100 and the respiratory rate 24. The patient was restless and cried with headache and pain in the back of the neck; earache was also present. The dressing was removed from the left ear; some purulent drainage was present. The patient complained of photophobia.

On July 29, 1939, the patient's temperature rose to 104° F., the pulse rate was 152 and the respiratory rate 30. She complained of headache and left earache. She was extremely lethargic, though she was taking her food well. The left ear was dressed. Dr. Ian Wood examined the blood; the hæmoglobin value was 78%. The patient was very cyanosed in the morning.

On the following day the patient complained of left earache, and on July 31, 1939, her temperature was 100° F. and her pulse rate 124. She complained of earache and pain in the head, and was very quiet.

The Third Operation.

Under a general anæsthetic given by Dr. Guy Springthorpe I removed the "Clauden" packing from the sinus and cavity extending from the external auditory canal and repacked it. Hæmorrhage did not occur. There was still much swelling of the soft palate and left peritonsillar region, but little or no bleeding. The mastoid wound was dressed; it did not show any extension of the suppuration. I still refrained from exposing the lateral sinus for fear of spreading the infection. The patient was returned to the ward in a satisfactory condition.

Progress.

On August 1, 1939, the patient's temperature was 104·8° F. and the pulse rate was 150. There was a little blood-stained discharge oozing from the left ear. The patient was restless.

On August 2, 1939, the patient's temperature was 105° F., the pulse rate was 142. The wound in the neck was dressed;

ILLUSTRATIONS TO THE ARTICLE BY DR. E. WESTON HURST.

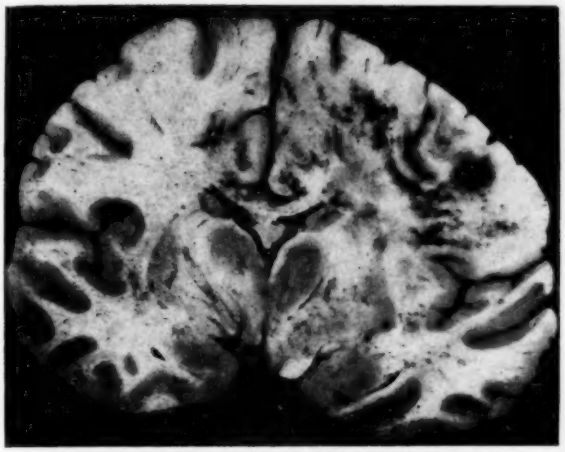

FIGURE I.—Macroscopic appearances in Case I.

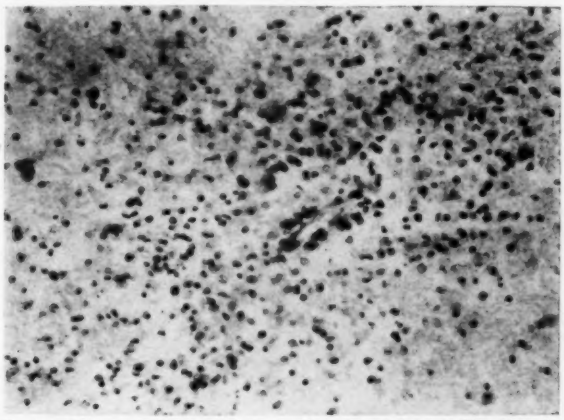

FIGURE II.—Polymorphonuclear and mononuclear infiltration in the nervous tissue around a small vessel. In Weil preparations the infiltrated area showed almost complete demyelination. The normal cellularity of the part is seen at two corners. Hæmatoxylin and Van Gieson stains.

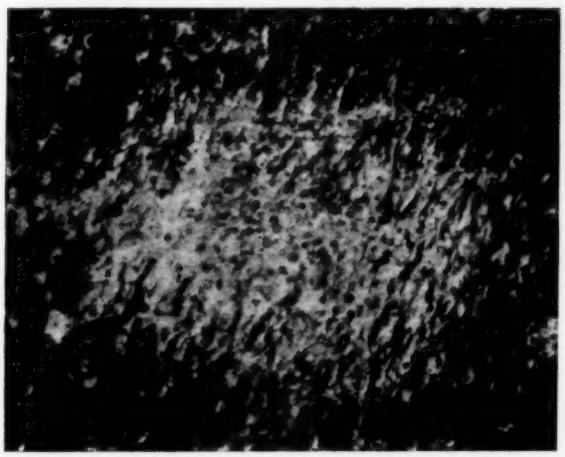

FIGURE III.—A focal area of partial demyelination. The central cells are polymorphonuclear and mononuclear, not red blood corpuscles. Weil's stain.

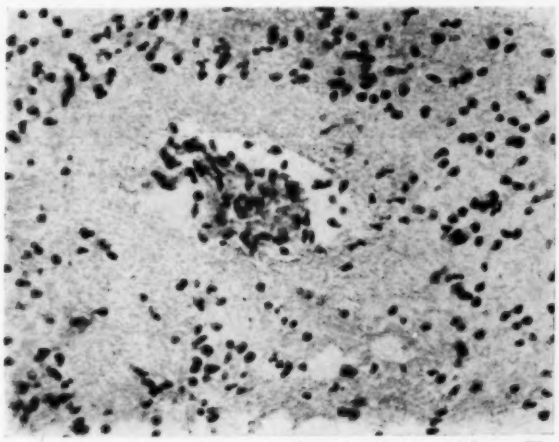

FIGURE IV.—Perivascular necrosis around a venule. The acellular area around the vessel shows only a few pyknotic and karyorrhectic nuclei and stains bright orange with Van Gieson's stain. Hæmatoxylin and Van Gieson's stains.

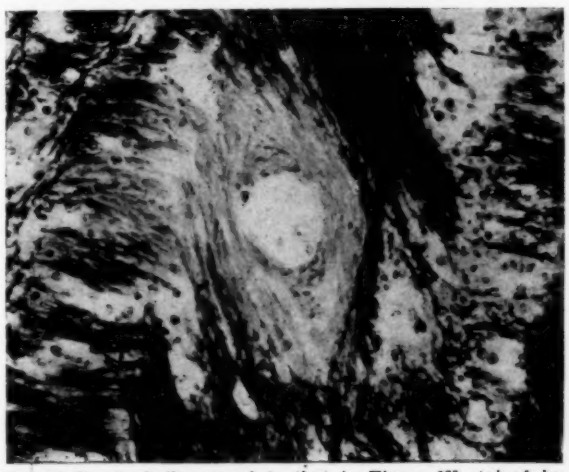

FIGURE V.—A similar vessel to that in Figure IV stained by Weil's method. In the acellular area nearly all staining of the myelin sheaths has been lost.

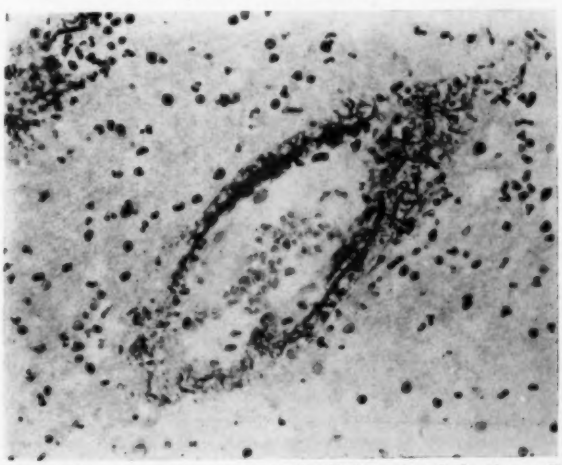

FIGURE VI.—A venule, showing the fibrin network in the wall and in the perivascular space. Phloxin and methylene blue stains.

ILLUSTRATIONS TO THE ARTICLE BY DR. HENRY MORTENSEN.

FIGURE I.

FIGURE II.

FIGURE III.

ILLUSTRATIONS TO THE ARTICLE BY DR. ARTHUR M. HILL.

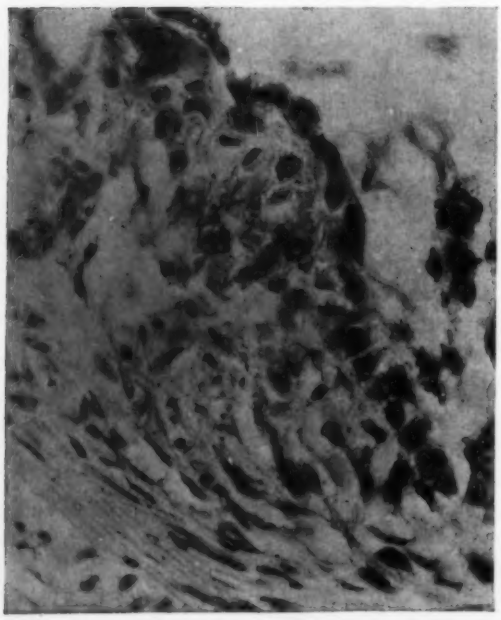

FIGURE III.
Photomicrograph of section of uterine tumour, showing typical chorionepithelioma. Both Langhans's and syncytial cells are present.

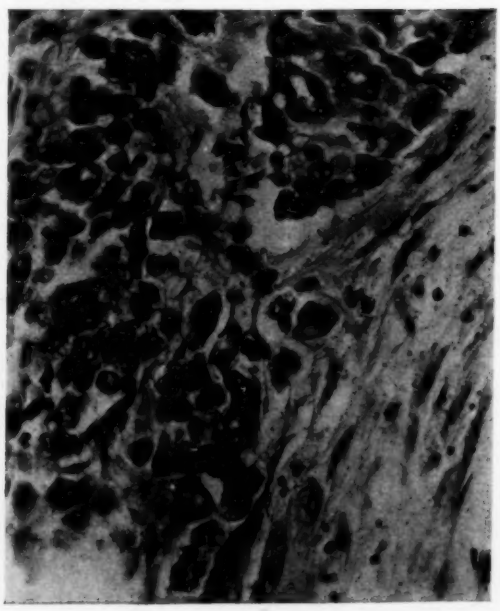

FIGURE IV.
Photomicrograph of section of uterine tumour similar to Figure III.

there was a fair amount of hæmorrhage and some purulent discharge was noted. The patient was rather cyanosed; her respiration was rapid. She had a shivering attack and vomited some bright blood. Later on in the day her colour improved.

On August 3, 1939, her temperature was 99·4° F. and her pulse rate 100. She was very quiet and slept at intervals. She was very pale and restless and complained of pain in the back of the head and in the left ear.

On August 4, 1939, the patient's temperature was 99 and her pulse rate 112. She complained of left earache and of a nasty smell in the nose. She was rational and talked a little. Her colour was poor, but she was not cyanosed. Twitching of the nose was present. She said that she felt giddy when her head was lifted up. The hæmoglobin value was 76%.

On August 5, 1939, the temperature was normal, the patient slept more and had a good night. The ear wound was dressed; the "Clauden" gauze was shortened. A purulent discharge was present from the left ear and the wound in the neck.

From now onward the patient's condition gradually improved. Between August 6 and 15 the temperature only twice rose above 100° F. On one occasion vomiting occurred and on another the patient became drowsy and complained of pain over the left eye, she was miserable and restless, had photophobia and bad headache and the pulse was irregular. The irregularity lasted for two days and the pain over the left eye also lasted for two days and on the second was accompanied by vomiting.

On August 16, 17 and 18, 1939, the patient's temperature was 101°, 103° and 102° F. respectively. It then became normal and with the exception of one day when it rose to 100° F. it remained practically normal until her discharge from hospital on September 15, 1939. During this period her chief complaint was headache, but this was not troublesome after August 22. The rise of temperature to 100° F. occurred on August 22, when the patient had a common cold with a cough that was a little troublesome. On August 28 the patient was allowed to sit up on a chair and she began to walk on September 5.

Discussion.

At the start one was faced with the question as to whether any operative treatment should be undertaken. The child's general condition was very low, and the amount of bleeding from the ear appeared to be less; therefore I decided to wait. Treatment by morphine, blood coagulants, intravenous injections of saline solution, blood transfusions and ice locally applied was carried out. As regards the infective process, it seemed that any mastoiditis that might be present could wait also. "M & B 693" tablets were given.

The right ear followed the usual course of an acute suppurative *otitis media* without any apparent complication. The swelling on the left side of the neck, according to the mother, was not present prior to the child's going into the hospital. It must have come up suddenly at the time that the hæmorrhage from the ear occurred. It did not appear to be inflammatory in origin, so no local treatment to this was prescribed beyond the ice bag. The very high temperature of 105·2° F. was difficult to explain. It did not seem that the inflammatory infective condition accounted for it altogether. One notes that it went up to 105·2° F. again on July 23, 1939, the rise on each occasion being associated wtih the onset of a severe hæmorrhage.

For three days the child gradually picked up in general condition, pulse and colour improved and there had been no more hæmorrhage. Then on the fourth day after admission to hospital there was a sudden recurrence of the bleeding from the left ear. I felt that operation was now necessary in order to seek the origin of the bleeding and to deal with it if possible. The acutely inflamed left mastoid also required attention, and further investigation of the left cervical swelling was indicated.

As a result of this operation I felt more assured about the infective element, but certainly not in regard to the hæmorrhage. It appeared that one of the large blood vessels had been eroded. The jugular bulb might have ruptured as a result of infection and inflammation, through a dehiscence in the floor of the middle ear. But this did not seem likely in view of the character of the hæmorrhage and the presence of the large bleeding fistula which had ruptured through the membranous portion of the external auditory canal.

Altogether the symptoms and signs pointed rather to an erosion of the wall of the internal carotid artery with rupture at the point of its close relationship to the tympanic cavity (see Appendix).

According to the mother's history, the child had not complained of any trouble in the left ear prior to three days before the sudden hæmorrhage; but the child had not been at all well for fourteen days previously. The right acute *otitis media* had passed the acute stage and the ear was discharging in the usual way without complications. Some other infective process must have been going on. It may have been in the left ear, even though Dr. Wawn, who examined the drums, did not note any inflammation in this ear until two days before the hæmorrhage (that is, when the child first complained of left earache).

The child stood the first operation quite well, though that night she had a good deal of coughing. Next day it was noticed that her speech was very slurred and indistinct. Examination revealed a very large peritonsillar swelling. The left tonsillar fossa was pushed over, almost touching the right, and the soft palate and left pharyngeal area were involved in the general swelling. It was not inflammatory in appearance. Next day there was a sudden rupture of this swelling with free hæmorrhage into the mouth (eight ounces in five minutes). The site of the rupture was through the soft palate just above the left tonsillar fossa. The following day the temperature rose to 105·4° F. and there was free bleeding from both the left ear and the mouth. It was apparent that mere packing of the wound as done at the first operation was not sufficient. Therefore, with a view to having the carotid artery ligated, I asked Dr. Upjohn to see the patient. He decided to operate that day.

This was successfully carried out under a general anæsthetic administered by Dr. Guy Springthorpe, whilst Dr. Ian Wood kept up the blood transfusion.

After Dr. Upjohn had completed his operation and closed the incision in the neck I dressed the mastoid wound and further explored the sinus leading from the external auditory canal. I felt that there was a very extensive infiltration of blood and clot down the left cervical region and forwards towards the lateral wall of the oro-pharynx. "Clauden" ribbon gauze was firmly packed in. There was a little bleeding from the mouth and left ear during the two days after the operation, but after that there was no further severe hæmorrhage.

The "Clauden" packing I am sure helped considerably. It was left in for a week and then removed under a general anæsthetic, another strip being put in. This piece was gradually shortened until the anterior sinus healed. During this stage there was purulent discharge from the sinus and also from the middle ear. The swelling in the oro-pharynx also gradually subsided.

As seen in the notes, it was a rather stormy passage for a while after the tying of the left carotid arteries.

During the week from August 14, 1939, when the patient was complaining of pain over the left eye with headache, vomiting and raised temperature, I was rather anxious as to whether there was any spread of infection through the petrous portion of the temporal bone. But when the signs of an acute suppurative anterior nasal sinusitis appeared, I felt much relieved. The suppurating maxillary antrum did not require puncture and wash-out.

The patient returned home after being in hospital for two months. It is now just over a year since then, and during that time she has picked up remarkably well. She went through a rather severe attack of whooping cough and chicken-pox successfully. The right ear is dry and normal. The left ear is dry and she has moderate hearing. She has attended school all this year.

Acknowledgements.

I wish to express my keen appreciation of Dr. W. W. Upjohn's skill in tying the carotid arteries, and also to thank him for his help and advice during the worrying days that followed the operation. I also wish to thank Dr. Ian Wood for the wonderful way in which he carried on with the blood transfusions and intravenous injections of saline solution—it became most difficult to find suitable veins in such a young child; and Dr. Clive Disher and Dr. Guy Springthorpe for the very able manner in which they attended to the general anæsthetics under such difficult conditions. Much praise is due to the very efficient and careful nursing that the patient received whilst in Saint Benedict's Hospital; this had much to do with the final recovery of the child.

Appendix.

The following anatomical description is taken from "Gray's Anatomy":

> The Internal Carotid artery enters the Carotid canal of the Petrous portion of the Temporal Bone, it first ascends and then curves forward and medially.
>
> The artery lies at first in front of the Cochlea and Tympanic Cavity, it is separated from the latter cavity,

and from the Pharyngo Tympanic tube by a thin bony lamella which is cribriform in the young subject and partly absorbed in old age.

The following notes are taken from "Fatal Hæmorrhage from the Middle Ear in consequence of Erosion of the Internal Carotid Artery", in "Diseases of the Ear", by Politzer.

Politzer states that such cases are extremely rare. He records his own case, which proved fatal, and occurred in a phthisical individual, thirty-two years of age. He gives the post-mortem findings. Some other cases recorded by Hessler, Moore and Stembrugge are also commented on.

The spot of rupture was always at the site where the internal carotid artery changes its course from the vertical to the horizontal.

In every case the blood poured through the perforated tympanic membrane into the external meatus, except in the case reported by Pilz, in which the *membrana tympani* was intact and the blood escaped by a fistulous opening in the inferior wall of the tympanic cavity to an abscess cavity in the petrous portion of the temporal bone, and from there escaped by another fistula on the superior wall of the pharynx.

Politzer states that the duration of the aural affection until the appearance of the hæmorrhage varies from seven to eleven years. Only in two cases was it said to have existed for several months.

In the case of syphilis referred to above, as described by Pilz, the hæmorrhage occurred during the course of an acute caries. This patient was operated on by Bilroth ("Erosion of Right Carotid"), but death took place seventeen days after the ligation of the right and three days after ligation of the left internal carotid artery. In every case the termination was death.

Reviews.

ORTHOPÆDIC OPERATIONS.

ARTHUR STEINDLER'S "Orthopædic Operations" is a book of reference which every orthopædic and general surgeon should possess.[1] It is a great advance on the 1925 edition by the same author.

Every reader should digest the preface before embarking upon its contents, and it is well to remember that a surgical procedure at the hands of one operator may be a success, whilst another surgeon, who is more familiar with a totally different method, will obtain an equally satisfactory result.

The book is well conceived and faithfully delivered, and it incorporates several novel features for a book of its kind. Physiology in relation to orthopædic operations as opposed to the mere mechanics is apt to be forgotten sometimes, and the author endeavours to stress the importance of this aspect of surgery. The chapter on the biology of functional restoration is well written, though brief, and is worthy of consideration by all those who attempt surgery on the organs of locomotion. It is to be regretted that more space is not devoted to the chapter on special surgical risks which has been so well chosen. Reference to anæsthesia is most useful, especially to those who do not have the assistance of specialist anæsthetists. The chapter on post-operative care is far too short for a branch of surgery in which post-operative care is all important.

The list of operations which now confront the orthopædic surgeon is so great that such a work as this would be better dealt with in two volumes, when more detail could be given. The description of many of the operations is too brief to be useful, and unless the surgeon happens to be *au fait* with some of the procedures, it is doubtful whether he could perform them from the outlines given. It is refreshing to note the reference to the need of specially trained orthopædic nurses for this work.

Readers should remember that this is a book on operations and not on treatment, as its perusal may at times suggest.

We miss any reference to Kellar's operation for *hallux valgus*, as this is probably the best all-round surgical procedure for this disorder, and it is disturbing to read that massage and passive movements are advocated after operations on an elbow joint.

Dr. Steindler is to be commended for the amount of thought and work which he has devoted to the book.

[1] "Orthopædic Operations: Indications, Technique and End Results", by A. Steindler, M.D., F.A.C.S.; 1940. London: Baillière, Tindall and Cox. Super royal 8vo, pp. 776, with 322 illustrations. Price: 50s. net.

MEDICAL ELECTRICITY.

"MEDICAL Electricity for Massage Students", by Hugh Morris, is one of those definite clear-cut publications which look interesting and efficient even at the first glance.[1] This favourable impression results from the use of clear type, good paper, short paragraphs, with plain headings and simple clear illustrations. Such an arrangement is pleasing to the student, as each paragraph is a definitive whole, which deals simply and conclusively with the subject matter of the heading. Psychologically the path to knowledge is thus presented to the reader as an interesting succession of stepping stones rather than as a straight and monotonous highway. The mind sees a variety of small essays rather than a long and boring task.

The text is pleasingly direct, practical and informative, with just that amount of theoretical foundation necessary to the formation of a true understanding.

The book first deals with the principles of electricity and then applies them to a description of the electrical machinery and apparatus commonly used for treatment. This fills about one-third of the text and is followed by a fairly full description of the galvanic current with its attendant uses for muscle testing. Diathermy, high frequency and ultra-diathermy are fully considered.

Then follow some hundred pages on light treatment in its various forms. This portion is satisfying and complete in a practical way. Here, as elsewhere, no abstruse or contentious matter is introduced, but the author confines himself to a straightforward account of those methods and procedures currently adopted and accepted.

Finally there is a chapter on diseases and their treatment. No results are given, but once again conventional electro-therapeutic methods suitable for the particular disease are indicated without comment.

A handy glossary of terms completes a well-executed work of nearly four hundred pages which can be recommended not only to massage students but even to medical practitioners interested in this subject.

FORENSIC MEDICINE.

SYDNEY SMITH'S "Forensic Medicine" is now in its seventh edition.[2] The issue of a new edition two years after the sixth edition is ample evidence of the popularity and high esteem of this book.

In the new edition the section on hairs and fibres has been amplified. Illustrations have been added and attention is drawn to the differences in the cuticular scale types in mammalian hairs. New subject matter and additional illustrations have been added to the section on head injuries.

The section on blood grouping has been brought more up to date by fuller reference to methods of grouping dried blood stains. Additional information is introduced in a brief discussion on the heredity of the blood groups. The author has referred the reader to some seven or eight works in which this subject is discussed more fully. In view of the generalized interest in questions of legitimacy and disputed paternity it is likely that these will be discussed at greater length in subsequent editions. In different parts of the English-speaking world legislation has been either passed or projected concerning disputed paternity. It is felt that space might be found for the inclusion of a chapter on the "Individuality of the Blood", somewhat on the lines of the chapter so named in the recent edition of the work by the author in collaboration with Professor John Glaister.

When occasion arises to investigate the cause of death by violence, by accident, or by suspected poisoning, there is no handier book to which one may turn for help.

The book is ably and conservatively written and represents a standard work that is of inestimable value as a work of reference to the general practitioner who indulges in but occasional journeys into the realms of forensic medicine. It still remains the vade-mecum of all police surgeons and those who perform autopsies in cases of sudden and uncertified death.

[1] "Medical Electricity for Massage Students", by H. Morris, M.D., D.M.R.E.; Second Edition; 1941. London: J. and A. Churchill Limited. Demy 8vo, pp. 408, with 114 illustrations. Price: 18s. net.

[2] "Forensic Medicine: A Textbook for Students and Practitioners", by S. Smith, M.D., F.R.C.P., D.P.H., with an introduction by H. Littlejohn, F.R.C.S., F.R.S.E.; Seventh Edition; 1940 London: J. and A. Churchill Limited. Demy 8vo, pp. 696, with illustrations. Price: 25s. net.

The Medical Journal of Australia

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THE MEDICAL STUDENT AND PUBLIC HEALTH.

At the beginning of this century the teaching of public health was very different from what it is today. Nowadays it is generally recognized that the practice of public health is a specialized branch of the practice of preventive medicine; it used to be a thing apart, but since it has become known as a special branch of what it is or should be, the central activity of medicine, it has acquired a new dignity and those who practise it have been given a high place in the ranks of specialists. Forty or fifty years ago public health was taught as a separate subject; nowadays it appears in Australian university calendars linked with its parent subject, and "public health and preventive medicine" is the subject taught. That the scope of preventive medicine has grown beyond all recognition even in the last twenty-five years was shown in striking fashion by F. S. Hone in the special article that he contributed to the Silver Jubilee Number of this journal in July, 1939. Obviously the field of the public health practitioner has also become much more extensive. In a paper that he read in February, 1941, before a joint meeting of the Council on Medical Education and Hospitals and the Federation of State Medical Boards of the United States at the Annual Congress on Medical Education and Licensure, Haven Emerson, of New York, defined the practice of public health as "the application of the sciences of preventive medicine through government for social ends".[1] For practical purposes this is a satisfactory definition, but at the same time it must not be accepted in its strictly literal sense. Most of those who devote themselves to the practice of public health are government servants; they hold positions in government health departments, or, being in general medical practice, occupy the position of government medical officer or health officer to a district on a part-time basis. But every practitioner of medicine touches the practice of public health at some point, even if he does no more than notify to the public health authorities the occurrence of infectious disease among his patients. Whenever he complies with a regulation issued by the health department of State or Commonwealth, or when he assists, or opens the way for, a departmental officer to comply with such regulations, he takes an active part in public health practice. The curriculum of a medical school is therefore so arranged that a graduate has the opportunity of making himself familiar with public health matters. On graduation he should be sufficiently well equipped to occupy a junior post in a health department, just in the same way as he ought to be able to carry out the duties attached to a junior medical or surgical appointment. As he makes progress in his specialty he may wish to have a higher qualification as evidence of his proficiency; he will then take a diploma in public health in the same way that a physician or surgeon will acquire a higher degree in medicine or surgery of his own university or a diploma from one of the colleges of physicians or surgeons. Most health departments at the present time require appointees to higher positions in the service to be holders of a special diploma. The full-time public health officer is thus in every sense a specialist; in fact he probably earns the title with more justification than many so-called specialists in medicine or surgery, for it is difficult for him to go beyond the limits of his specialty to poach on the preserves of another, and so he never makes the attempt.

An appreciation of the foregoing considerations is necessary before any attempt is made to discuss the teaching of public health to medical students in their ordinary curriculum. Just as the practice of public health is part of the practice of preventive medicine, so the teaching of the two subjects cannot be separated. We have seen that in Australian universities public health and preventive medicine are taught as one subject, as indeed they should be, but it must not be thought for a single moment that the teaching of preventive medicine should be confined to the hours of instruction devoted to that subject. To study as well as to practise the prevention of disease demands in the student and practitioner an attitude of mind that is essentially different from that of one who is concerned solely with the cure of human maladies. This attitude of mind may be hard to acquire, but once it has been acquired it will dominate the whole outlook. It cannot be assumed in the preventive medicine class room or laboratory and discarded when the room is left. The idea of prevention should underlie all clinical teaching in medicine. No systematic lecture in medicine, no clinical demonstration at the bedside or in the out-patient department, no surgical adventure is complete unless an attempt has been made to describe or discover the cause of the ailment and methods for its prevention have been discussed. Emerson, in the address already mentioned, put this point well when he said that unless in medicine, surgery, obstetrics and pædiatrics the preventive aspects were dealt with, there was but a forlorn hope that any devotee of public medicine could inculcate ideas when the hero of the amphitheatre had ignored the matter. When prevention

[1] *The Journal of the American Medical Association*, March 15, 1941.

is preached to the student by all his teachers as the highest aim of medicine and treatment to effect a cure is regarded as something attempted *faute de mieux* he is well on the road of proper appreciation and will readily learn the lessons of public health. Exactly what subjects he shall be taught and in what detail need not be discussed in this place at any great length. On the purely preventive medicine side the student will be taught something about man as an individual who passes through certain stages of life and development, who has bodily and mental needs at each stage, and who at every stage is exposed to risks of damage to both mind and body. On the public health side, although the distinction between this and preventive medicine need not be made, the student's attention will be drawn to his relationship with official bodies and to the obligations that he will face when once he is qualified and goes into practice. The syllabus will thus include maternity and child welfare, maternal mortality and infantile mortality, campaigns against tuberculosis and venereal disease, sanitation in urban and rural districts, industrial and mental hygiene, housing and town planning, infectious diseases, milk supply, nutrition, mental defectiveness, and at the present time particularly military hygiene. A host of other subjects might be mentioned, but one that must not be forgotten is medical statistics, and it is to this that we would direct special attention.

In the undergraduate teaching of public health and preventive medicine the study of medical statistics need not be so intensive as in the course of study for the diploma in public health, but we would insist that in his undergraduate days the student should be given an understanding of what statistics in relation to disease really means. At the present time the impartial observer must conclude either that students are taught nothing of the significance of figures in relation to disease, or that they become so obsessed by what appear to be their clinical triumphs that they lose all sense of proportion and draw the most ridiculous conclusions from them. In no other way is it possible to explain the all-too-frequent spectacle of an author who reports a handful of cases, maybe ten or twenty, some of the patients recover and some die, and the results of therapy are stated in percentages. Not infrequently has it been stated that in a certain group one patient recovered after a certain form of treatment, "a percentage recovery of 100%" with that treatment. If students were taught the real value of medical statistics and if they remembered what they were taught they would not in after life make themselves look ridiculous by tabulating in percentages their tiny, but perhaps none the less praiseworthy, results. It may be that a great deal will depend on the way in which medical statistics are taught. Emerson has some ideas on this subject, for he tells us that the course in medical statistics should be given by a teacher who has the imagination of a professional gambler and also the experience of a civil engineer, an epidemiologist or a biophysicist—a rare combination and difficult to find even in such a country as Australia, tinged as its people undoubtedly are with the gambling instinct, but, we should imagine, effective if it could be found. Emerson writes that if such a teacher were used by clinicians before they arrived at conclusions of therapeutic triumph on their first seventeen patients, or assumed a falling case fatality percentage based on one winter's experience with pneumonia, there would be less irresponsible medical publication. Surely no one can seriously disagree with this dictum.

One aspect remains and it has to do with the student's practical experience of public health work. Emerson describes what he calls the technical difficulty which the teacher of public health has to try to overcome, that of bringing the student and the public, the community as a patient, face to face. He states that the community as a patient or object of medical diagnosis and protection must be made real to the student. He points out that the teacher has to avail himself of current reports, of epidemics, of administrative episodes or efforts at prevention or control, and of evidence of success or failure to use the recommended procedures and resources to avoid disease. This will be admitted and it will also be admitted that by these means, objective as they are, students may be taught in a fairly effective fashion. Emerson has no further suggestions to offer. It may be useful therefore to recall a scheme put forward in conversation by Victor Heiser, of the Rockefeller Foundation, when he was in Australia a few years ago. He held that the ideal method of bringing the student face to face with the public and public health administration was to appoint the teacher of students (the professor or lecturer in the subject) as medical officer of health with jurisdiction over an area near the medical school, so that he might have the students divided into groups and allotted to him as "clinical clerks" who would take part in the district inspections and other routine for a fixed period in the academic year. This would have to be carefully arranged and it could probably be so planned that it would neither interfere with other studies nor prolong the curriculum. So far as we are aware such a scheme as this has not been considered in Australia, but it is sound in conception and would make the student appreciate what the practice of public health really means and what it can do for the community.

Current Comment.

LOW BLOOD PRESSURE AND AVIATION.

As is but natural, a great deal of interest has been taken in the high standards of fitness that are demanded in recruits to the Royal Air Force and the Royal Australian Air Force. The stability of the nervous system is the first thing that has to be determined, and is generally regarded as the most important attribute of a flier. Stability of the cardio-vascular and respiratory systems is second in importance only to that of the nervous system. Latterly more attention has been paid to the cardio-vascular system; although flying at great heights throws a great strain on the respiratory system, apparatus for the supply of oxygen has been improved to such an extent that problems associated with respiration are not now so clamant. The enormous speed at which the modern aeroplane travels is the factor that has created difficulties for the cardio-vascular system. The greatest effect of high-speed flying is seen in what is known as a black-out, a condition caused by centrifugal force that comes into play in high-speed flying with change of direction, acceleration or deceleration. This condition was discussed in these pages in the issue of January 27, 1940, in the light of an article by Wing-Commander P. C. Livingston published in *The British Journal of Surgery* of July, 1939. Readers will also find an interesting contribution on visual complications of high-speed flying by Conrad Blakemore

in the 1940 volume of the "Transactions of the Ophthalmological Society of Australia (British Medical Association)".

A. F. Rook and D. J. Dawson, in *The Lancet* of December 31, 1938, in the opening paragraphs of a noteworthy discussion on hypotension and aviation, quote Flack and Bowdler, who wrote in 1920 that stress of service or high flying almost invariably produces a low diastolic pressure and a big pulse pressure, due probably to lessening of vaso-constrictor tone of the arterioles. From this it appears that opposition to centrifugal force is not the only factor that has an untoward effect on the cardio-vascular system. The subject of hypotension has engaged the attention of medical authorities on aviation, and those who examine recruits for air force service look with disfavour on men who have a systolic blood pressure below 110 millimetres of mercury and a diastolic pressure of below 70 millimetres. Rook and Dawson in their study of 1938 went thoroughly into the whole question of hypotension and aviation, and reported experimental observations that they made. They pointed out that hypotension (they accept the 110 and 70 millimetre standard) is sometimes accompanied by symptoms such as giddiness, and they hold that this association should be an absolute bar to flying. They also found that an isolated finding of a severe grade of hypotension was compatible with good health, but that it always called for considerable caution when assessments were being made for flying duties. They divided hypotensive persons into two ill-defined groups, occasional hypotensives and persistent hypotensives. Occasional hypotension was in their experience not uncommon, and was found in a large proportion of young adults when repeated examinations were made. They thought that an isolated finding of moderate hypotension was of little importance in regard to flying. Persistent hypotension was, they stated, comparately rare; it was not necessarily or even usually permanent, but lasted for a variable period. It might be associated with symptoms of hypotension, and in these circumstances it was a bar to flying. They insisted, however, that it was consistent with good health and that piloting duties might then be permitted. The experimental observations reported by them were made on nine hypotensive pilots, five pilots who had normal blood pressures but gave poor results in the physical tests, and eleven who had normal blood pressures and gave satisfactory results in the physical efficiency tests. Rook and Dawson realized that the number of persons tested was too small to justify the drawing of any but the most tentative conclusions, and they added that their observations seemed to indicate that hypotension *per se* "unless marked" was no criterion of the severity of symptoms likely to be caused by centrifugal force. The significance of this statement will depend on the interpretation of the word "marked". This word has been so done to death that it has become the bugbear of medical literature. Morris Fishbein inveighs against it in his book "The Art and Practice of Medical Writing"; his objection to such a loose use of the word is that there is no accurate indication of what qualification the writer means. We must presume that when Rook and Dawson write "marked" they mean excessive. The most important conclusion put forward by Rook and Dawson is that in all probability the ability of the cardio-vascular system to withstand centrifugal effects during flight depends largely on its power to react rapidly to stress. "This power is as necessary for the person with normal blood pressure as for the hypotensive."

The latest author to discuss hypotension in aviation is C. A. Young, who is a lieutenant-commander in the Medical Corps of the United States Navy.[1] He discusses the condition and reviews 159 fatal crashes. He begins with the remark that recent investigation has shown that more emphasis should be placed on hypotension as a factor in assessing standards of fitness for aviation training. We have, he thinks, been prone to look upon persistently low blood pressure as entirely compatible with a normal state of well-being and health; it is, however, another matter whether it is compatible with the stress and strain incident to the violent flying indulged in by naval aviators, especially in war-time. Remarkable advances have been made in aviation medicine, and this has lowered the accident rate. During the last year, despite the increased scope of naval aviation activities in the American fleet, the accident record was 31% less than during 1938. Young discusses the factors influencing hypotension; those to which he attributes an active role include a tropical climate, anoxæmia and an emotional component. He found hypotension in 9% of 716 candidates for naval cadetship and he thinks that it is commoner in young male adults than is generally imagined. In an interesting section on the relation of hypotension to centrifugal force he makes out a good case for the view that hypotension may be the real cause of fatal and unexplained crashes. Discussing the present world war, Young refers to reports that at a minimum for every four pilots killed as a direct result of combat, six lose their lives because their judgement becomes faulty or their bodies are unable to stand the strain. Some American authorities, we are told, insist that pilot failure is accounting for six out of seven deaths. Young asks whether some of the young men who are killed in peace-time aviation accidents do not owe their deaths to cardio-vascular instability or hypotension. He also wonders whether the human machine is not being overloaded owing to the complexity of the control of aircraft. In this connexion it is interesting to note that H. G. Armstrong in his text-book on aviation medicine, which was reviewed in this journal in the issue of June 22, 1940, states in the chapter dealing with accidents in aviation that the aviation industry seems to have overlooked the fact that human beings, like materials, have a limited capacity. He holds that the sooner the industry realizes this and devotes its attention to developing aircraft within the capacity of the human intellect, the sooner accident statistics from pilot error will approach zero. In his opinion there are certain things that the designers and builders of aeronautical equipment can do without further research which should make pilot duties more simple of accomplishment, with resulting improvement in air transport safety. Improved performance and simplification are not incompatible. But this is a digression; we must return to Young. He has studied the records of 114 experienced naval aviators who were involved in fatal crashes and the crashes of 45 student naval aviators. Of the 159 men, 73 or 45·9% were hypotensives (experienced men, 48 or 42·1%; students, 25 or 55·5%). In 62 or 85·6% of the crashes in which the 73 hypotensives were involved, the crash was stated officially to be due to error of the pilot. Young realizes, as did Rook and Dawson in their study, that the number of crashes investigated by him is too small to allow him to draw any but the most tentative conclusions. This is true, but at the same time two of the paragraphs in the summary are worthy of reproduction:

> Ability of hypotensives to withstand centrifugal force depends upon the reaction of the vasomotor system, modified in some cases by an efficient physiological reserve to maintain a nearly basic blood pressure and pulse to meet an emergency, be that a serious or harmless emotional situation. Furthermore, if continuous violent flying is indulged in over a long period of time this reserve can become exhausted due to fatigue and bring about a symptom complex similar to that seen in moderate and severe grades of hypotension with postural giddiness due probably to lessening of vaso-constrictor tone of the arterioles.
>
> It seems reasonable, therefore, to conclude that the individual with a normal blood pressure would be better able to withstand continuous violent flying under combat conditions over a longer period of time with less exhaustion and fatigue than the hypotensive. In other words, he would be less apt to "go to pieces" or to commit pilot error under stress.

Young's final plea for further study of this interesting subject is the only possible one. Our reference to the subject has been perforce somewhat sketchy. Those whose special duty lies in the selection of recruits to the air arm or in the administration of air defence services, will do well to read Young's paper critically and in detail. The whole subject of aviation bristles with medical problems and apparently that presented by hypotension is not the least of them.

[1] *United States Naval Medical Bulletin*, April, 1941.

Abstracts from Medical Literature.

THERAPEUTICS.

Barbiturate Intoxication and Picrotoxin.

JOHN P. ANDERSON (*Annals of Internal Medicine*, May, 1941) writes a report of twenty cases of barbiturate intoxication, in fourteen of which treatment by picrotoxin was used. Serious symptoms of barbiturate poisoning do not occur unless twelve times the usual dose of the drug is ingested. Ordinary stimulants are ineffective, except in mild cases. The author has found picrotoxin to be effective and has failed to notice ill effects following its use. It must be given in doses sufficient to keep the patient in a slightly restless condition. Picrotoxin therapy should be instituted promptly if the reflexes are abolished. The drug should be given intravenously at the rate of approximately one cubic centimetre or three milligrammes each minute until the corneal reflexes reappear and the patient responds to painful stimuli. Thereafter administration should be repeated at intervals of one or two hours in a dosage sufficient to keep the reflexes active. This requires approximately three to six milligrammes an hour, depending on the degree of depression. Whenever the patient is allowed to lapse into a severe depression for several hours his chances of recovery are greatly lessened. Prompt lavage of the stomach, followed by the injection of glucose and sodium chloride solutions for diuresis is an important part of the treatment. Of the twenty patients, five died. Three of these deaths could not be regarded as failures of picrotoxin treatment; in the other two cases the treatment was adequate but unavailing because of the severity of the intoxication and the presence of extensive pneumonia.

The Fate in the Body of Sulphapyridine.

A. J. BLACK (*Edinburgh Medical Journal*, April, 1940) reports some preliminary conclusions in regard to the fate in the body of sulphapyridine. Sulphapyridine resembles alcohol and sodium salicylate in regard to its absorption and distribution. The rate of absorption is extremely variable, depending on a large number of factors, such as the size of the dose and the health of the patient. The clearance of sulphapyridine is effected partly by acetylation of the free drug by the liver and partly by excretion by the kidney. A constant proportion of drug present is removed per unit of time; the acetylated drug is excreted about three times as rapidly as is the free drug, and therefore removal is dependent almost equally on the activity of the liver and of the kidney. Available evidence indicates that there is a very wide individual variation in the rate of acetylation, as shown by the wide variations in the rates between free and conjugated drug both in the blood and in the urine. The therapeutic action of the drug may be assumed to be proportional to the blood concentration of free drug. Information is available concerning the relation of dosage and therapeutic effects, but more information is needed regarding the relation between the blood concentration of free drug and therapeutic effects. It is generally agreed that the acetylated drug is toxic and therapeutically inert, and its rate of production by the liver and its rate of excretion by the kidney appear to vary independently; this accounts for the wide variation in the blood concentration of acetylated drug. The author is of the opinion that if a definite relation could be demonstrated between the blood concentration of the acetylated drug and the incidence of toxic effects, this would indicate profitable lines of research on methods for reducing the latter.

Sulphapyridine Overdosage and Hypnotics.

R. K. RICHARDS (*The Journal of Laboratory and Clinical Medicine*, May, 1941) has carried out some experimental work on the antidotal action of hypnotics in sulphapyridine overdosage. Rabbits and dogs were used. Death from intravenously administered lethal doses of sodium sulphapyridine occurs in rabbits and dogs during or after violent tonic and clonic convulsions. Small doses of hypnotics, such as urethane or "Nembutal", can inhibit the convulsions and save life. Subhypnotic doses of the urethane or "Nembutal" are most effective; larger doses may cause death by adding to the secondary depressant action of sulphapyridine. This summation of effects can be overcome by the administration of picrotoxin. The restlessness, nausea and vomiting that follow large doses of sodium sulphapyridine given to dogs may be eliminated by subhypnotic doses of "Nembutal". The author believes that the experimental results described by him justify the trial administration of small doses of sedatives in combination with sulphapyridine to alleviate irritating side effects of the drug on the central nervous system. In an addendum to the paper the author states that "Nembutal" has the same effect in combination with sodium thiazole that it has with sodium sulphapyridine.

Colloidal Aluminium Hydroxide and Absorption of other Substances from the Bowel.

ROBERT C. BATTERMAN AND O. ALAN ROSE (*American Journal of Digestive Diseases and Nutrition*, January, 1941) tried by an experiment to ascertain whether colloidal aluminium hydroxide interfered with the absorption of other substances present in the gastro-intestinal tract. They gave 60 to 150 milligrammes of homatropine methyl bromide to six normal subjects and noted at fifteen-minute intervals the effect on the blood pressure, pulse rate, pharyngeal and mouth dryness, visual acuity and the near point. They came to the conclusion that the absorption of the drug from the gastro-intestinal tract was uninfluenced by the presence of colloidal aluminium hydroxide.

Morphine and Analgesia.

MORPHINE is considered to be the best pain-relieving drug that the clinician has at his disposal; yet the tolerance, addiction and gastro-intestinal disturbance that accompany its use are disadvantageous. Various attempts have been made to produce substitutes without distinct success. Donald Slaughter *et alii* (*The Journal of the American Medical Association*, December 14, 1940) have used a combination of morphine and prostigmin methylsulphate in a series of approximately 100 cases. Prostigmin is a stimulant to the parasympathetics and inhibits cholinesterase; the advantages over physostigmin are little miotic effect, few untoward cardiac effects and a greater stimulating action on the small intestine. Excellent relief from pain in a variety of conditions (trauma, gunshot wounds, fractures, post-operative pain, coronary occlusion) was obtained by using one cubic centimetre of a 1 in 2,000 solution of prostigmin methylsulphate with decreased amounts of morphine (one-half the usual dose). No side reactions or untoward effects were noted. When this combination is used as a preparative measure for sedation, the post-operative complications of ileus, distension and anuria are minimized. Its post-operative use reduces the necessity for enemata and catheterization. Preliminary experimental work suggests that this combination lessens the tolerance and decreases the chances of addiction to morphine.

NEUROLOGY AND PSYCHIATRY.

Myasthenia Gravis.

THREE new cases of *myasthenia gravis* are presented by J. M. Meredith (*The Journal of Mental Science*, February, 1941). The author questions the value of "Antuitrin" as a therapeutic agent, as he believes that spontaneous remissions occur. He claims that the disease is characterized by over-destruction of acetylcholine at the myo-neural junction resulting in muscular asthenia. This destruction is due to esterase over-activity. It is counteracted by the administration of substances which depress esterase activity and restore to the normal state the creatine-creatinine metabolism. The most effective therapeutic agents are prostigmin, ephedrine in conjunction with prostigmin, potassium chloride and guanidine, either separately or in combination with prostigmin. The author believes that the ideal treatment has yet to be discovered, as certain cases end fatally in spite of all treatment. He questions the value of endocrine products.

A Form of of Familial Presenile Dementia with Spastic Paralysis.

THE clinical features and histological and post-mortem findings of an unusual case of familial presenile dementia with spastic paralysis is described by C. Worster-Drought, J. G. Greenfield and W. H. McMenemey (*Brain*, Volume LXIII, Part 3, 1940). The patient when first seen was an engine driver, aged forty-seven years. He was observed until he died at the age of fifty-four. His first complaints were of difficulty in speaking, lack of interest in his affairs and defective memory. His dementia and ataxia progressively increased. He showed perseveration and confabulation. His speech was slurred. Later he became bedridden and incontinent of urine and fæces. His younger sister came under observation at the age of forty-four years, and she is at present slowly deteriorating. The maternal grandmother became affected with paralysis at the age of forty. Her sister was affected in the same way. Other members of the family have been traced and some found to have died in mental hospitals, and others are known to have been paralysed. Altogether there are known to have been eight persons in the family afflicted similarly to the two described. The authors believe that a disturbance of the small blood vessels

of the nervous system which produced the disease is attributable to the absence of some specific factor or the result of an abiotrophic manifestation.

Severe Toxic Effects of Sodium Diphenyl Hydantoinate in Mentally Defective Epileptics.

SODIUM diphenyl-hydantoinate ("Dilantin") was given as routine treatment to twenty mentally defective epileptics by B. A. McGregor Williamson (*The Journal of Mental Science*, September, 1940). The average dose was 0·3 gramme per day. No evidence of previous existing renal disease was present in the group. The toxic effects were clinically identifiable with a state closely resembling "Nirvanol" poisoning. Hæmatoporphyrin appeared in some cases. There was a 20% mortality rate. A persistently low blood urea level was noted. Idiot and imbecile patients showed intolerance to the drug, which seemed less toxic to the high grades of mental defectives. The toxic manifestations did not appear for six or more weeks after the beginning of treatment. There was some relation between intolerance and pathological changes in the central nervous system.

A Comparative Study of Recovered and Deteriorated Schizophrenic Patients.

OTTO KANT (*The Journal of Nervous and Mental Disease*, May, 1941) compares certain clinical features in two groups of 39 patients: those who have completely recovered and those who in the course of years have deteriorated. The recovered patients were not treated by any form of pharmacological shock. The author finds that the following features — psychogenic precipitation, clouding of consciousness, acute or subacute onset, extroversion and pyknic physique—occurred six times more frequently in the recovered group. He considers such features to be valuable prognostic indicators. Conditions in the recovered group which presented a gradual onset resembled atypical depressive states. The recovered patients who had sustained more than one breakdown appeared to have completely recovered between individual attacks.

Syphilis in Old Age.

AN investigation by L. T. Hilliard and Brian H. Kirman (*The Journal of Mental Science*, January, 1941) of the incidence of syphilis in senile mental patients showed that 10% of these elderly patients gave evidence of a positive serological reaction. Senile patients often present neurological signs which may be taken for evidence of syphilis, whereas others with a positive Wassermann reaction may appear symptomless. Examination of the cerebro-spinal fluid showed that patients over seventy years of age might suffer from general paralysis. The authors believe that in 90% of their cases the presence of syphilis and a psychosis in the same patient is a coincidence. The results of this inquiry show that in a large number of cases the presence of syphilis is not incompatible with the attainment of a ripe old age.

Optic Atrophy Associated with Pernicious Anæmia.

THREE cases of visual failure due to optic atrophy occurring as an early symptom of pernicious anæmia are fully reported by J. W. Aldren Turner (*Brain*, Volume LXIII, Part 3, 1940). Such cases are considered rare. The three patients were men in middle life, and their first complaint in each instance was progressive failure of vision. Each presented a typical blood picture. All responded to early and thorough treatment by liver injections and the taking of iron. Cases from the literature are discussed, in which the patients did not respond satisfactorily to treatment, and the author suggests that in some of these the treatment was inadequate while in others the patient was practically blind before the underlying condition was diagnosed. The return of vision under treatment he thinks may be slow and may be not quite complete; but useful vision can be expected if the patient is treated adequately and early enough.

Lilliputian Hallucinations during Convalescence from Scarlet Fever.

NATHAN SAVITSKY AND SIDNEY TARACHOW (*The Journal of Nervous and Mental Disease*, March, 1941) report the case of a child of four years of age who during the third week of scarlet fever had lilliputian hallucinations. In these somewhat terrifying visual hallucinations the child saw multi-coloured perfectly formed yet tiny clowns moving across and under his bed. They disappeared and reappeared at intervals of about fifteen minutes. The child was not delirious, but remained intensely frightened. He was afebrile and exhibited no behaviour abnormalities. The author discusses other conditions in which lilliputian hallucinations have occurred. They are frequently encountered in acute intoxications, febrile states, alcoholism and narcotism, but have been reported in many other neuropsychiatric states.

Lead Encephalopathy in Children and Adults.

FIVE cases of lead poisoning, three in children and two in adults, are reported by Andrew J. Akelaites (*The Journal of Nervous and Mental Disease*, March, 1941). The clinical picture in children is not specific, but is similar to the symptoms found in increased intracranial pressure. Gastro-intestinal symptoms may be observed before the onset of the encephalopathy, which begins with headache and vomiting. Increasing drowsiness with coma leading to convulsions may develop rapidly. The prognosis is grave and the residua are frequent if the child survives the acute stages. In adults the clinical picture resembles that of a severe cerebral intoxication. Structural changes in the central nervous system are due to œdema resulting from exudation, which is probably blood serum. There are endothelial hyperplasia of the small vessels and hyperplastic changes in the leptomeninges, which in children may cause hydrocephalus.

Bergerson's Chorea.

THE various types of chorea and convulsive movements are discussed by Henry G. Hadley (*The Journal of Nervous and Mental Disease*, March, 1941), who also reports four cases of Bergerson's chorea. Three of these patients were student nurses of eighteen and nineteen years of age; the fourth was also a female aged eighteen years. In each case the contractions were limited to the lower extremities. The thighs flexed upon the trunk at regular intervals of ten to twenty seconds, and movements ceased during sleep. The condition lasted three weeks. No neurological signs were detected, and recovery in all cases was complete. The author states that any group of muscles may become affected and that the convulsive movements may pass from one group to another. The disorder is regarded as harmless. Discussion centres on the differential diagnosis from other choreas and convulsive movements.

Hutchinson's Teeth without Congenital Syphilis.

L. KERSCHBAUMER (*The Journal of Nervous and Mental Disease*, May, 1941) reports the presence of typical Hutchinson's teeth in non-syphilitic psychotic patients. The condition, he claims, is a rare one, although many other dental abnormalities have been observed in congenital defectives and schizophrenics. He gives clinical details of four patients displaying Hutchinson's teeth—two paranoid schizophrenics, a psychotic epileptic and a psychoneurotic. Serological tests gave negative results in all cases and there were clinical symptoms of neither congenital nor acquired syphilis in the patients themselves, nor as far as could be ascertained in the parents. All patients, however, came from definitely "tainted" stock. The author believes that the Hutchinson-like changes in these non-luetic mental patients were probably caused by some pathologically changed metabolism.

Psychoses in Officers in the 1914-1918 War.

IN view of the altered conditions of warfare in the present conflict, Harvey Baird (*The Journal of Mental Science*, January, 1941) gives a résumé of the psychoses from which 300 officers suffered in the last war. These existed in a smaller proportion than in the general population. The main predisposing cause was hereditary weakness, 59% having a definite hereditary predisposition. The commonest conditions were exhaustion psychoses and the manic-depressive psychoses. There was only one epileptic in the series. The author regards exhaustion as one of the commonest of the precipitating causes; and a gain in weight went hand in hand with recovery in a large majority of the psychoses. He also considers that many of the manic-depressive episodes were merely exacerbations of the cyclothymic tendencies of unstable individuals.

Agenesis of the Corpus Callosum.

PRIOR to the introduction of pneumoencephalographic methods, agenesis of the *corpus callosum* was seldom recognized before autopsy, according to Leon N. Goldensohn, Ed Rucker Clardy and Kate Levine (*The Journal of Nervous and Mental Disease*, May, 1941). These authors now report the case of a girl, aged eleven years and ten months, who was admitted to hospital suffering from over-activity, distractibility, temper tantrums, sexual preoccupation, inability to attend school, wetting and occasional soiling. The family history was normal. Physical examination revealed dysendocrinism and involvement of the central nervous system. Electroencephalography revealed diffuse cortical dysfunction and asymmetry of the cerebral hemispheres, together with the absence of the posterior portions of the *corpus callosum*. There is no known syndrome of agenesis of the *corpus callosum*; but the authors believe that the most frequent clinical manifestations are mental retardation and convulsive seizures.

Medical Societies.

MELBOURNE PÆDIATRIC SOCIETY.

A MEETING of the Melbourne Pædiatric Society was held on May 14, 1941, at the Children's Hospital, Melbourne, DR. H. L. STOKES, the President, in the chair. The meeting took the form of a series of clinical demonstrations.

Chronic Pulmonary Disease.

DR. HOWARD WILLIAMS showed a boy, aged two years, suffering from chronic pulmonary disease of unknown ætiology. He said that the child had been admitted to the Children's Hospital on April 15, 1941, having been in normal health until at the age of seventeen months he had contracted bronchopneumonia and tonsillitis. The illness lasted six weeks, and during that time he had lost some weight, but he had made a fairly good recovery. Then he began to wheeze during both inspiration and expiration and the wheezing had persisted. A little coughing at intervals had also occurred. The child ate well and seemed bright and happy and full of energy. No tuberculosis had occurred in the family, and he was not known to have been in contact with the disease. He was rather small for his age and weighed only twenty-six pounds, but he looked well nourished and was regarded as normal mentally at the time of his admission to hospital. On that occasion the temperature was 99·6° F., the pulse rate 110 per minute, and the respiratory rate 24 breaths per minute. The heart sounds were regular and clear and the heart did not appear to be enlarged or displaced. Inspiratory and expiratory wheezing was present, but the voice was not affected, and though the respiratory excursion was good, the right side of the chest did not move as well as the left side. There was some impairment of the percussion note anteriorly towards the right apex; and evidence was obtained of diminution of air entry over the whole right side of the chest with inspiratory and expiratory rhonchus. From an examination of films of the chest it was considered that the right hilar glands were considerably enlarged and that there was some infiltration at the base of the lung and in the subclavicular area.

Dr. Williams said that before a number of investigations were made the condition had been regarded provisionally as pulmonary tuberculosis with mediastinal adenitis. On two separate occasions the Mantoux test was carried out with dilutions of 1 in 1,000 and 1 in 100, but no reaction followed. No growth of tubercle bacilli was obtained by Dr. Reginald Webster by means of the special cultural method he had adopted, using bronchial mucus obtained from the stomach when the patient was in a fasting state. A thorough examination of the blood had failed to establish the presence of anæmia. The hæmoglobin value was estimated at 96%; the erythrocytes numbered 5,510,000 and the white cells 7,700 per cubic millimetre; examination of blood films showed that there was a plentiful supply of platelets and that no abnormal forms of erythrocytes were present. In the differential count of leucocytes 28% were found to be polymorphonuclear cells, 67% lymphocytes, 2% monocytes, and 3% eosinophile cells.

Dr. Williams went on to say that during the four weeks the child had been in hospital the wheezing in the chest had almost disappeared and he had gained more than two pounds in weight. In a later series of X-ray films it was obvious that the hilar gland enlargement and the pulmonary infiltration had diminished in extent. Dr. Williams thought the members of the society would be interested in the case and might care to comment on the diagnosis, further investigation and treatment.

DR. KEITH HALLAM said that on the radiological appearances and clinical history he thought that the diagnosis of intrathoracic tuberculosis could be sustained, but in that case they would have to ignore the results of the Mantoux test. He pointed out the presence of calcified nodules, which probably marked the position of a number of Ghon's foci. The appearances were suggestive of the effects of pressure on the main bronchus to the lung combined with swelling of the mucous membrane from bronchitis and the presence of emphysema in the lung. He did not think mediastinitis had occurred; it would not cause pressure on the bronchus and unilateral emphysema. He also remarked that the right side of the thorax was gradually sinking in, and orthopædic treatment would be required to prevent deformity.

DR. C. F. MACDONALD said that a study of the films had led him to the conclusion reached by Dr. Hallam, but the negative results of the Mantoux tests and the failure of cultural methods with material obtained by gastric lavage had disconcerted him. He wondered whether the physicians present thought that tuberculosis could be ruled out on the evidence.

DR. ROBERT SOUTHBY said that on purely clinical grounds he felt that the child was rather too well to be suffering from such extensive tuberculosis.

DR. H. BOYD GRAHAM suggested that as the child's condition was improving, further guidance might be obtained from the results of special radiological investigation after the instillation of iodized oil. He wondered also whether the child's chest had been carefully examined by fluoroscopy and whether better lateral X-ray films could be obtained to give a clearer idea of the contents of the posterior mediastinal space.

DR. KEITH HALLAM suggested that the possible presence of a non-opaque foreign body had still to be taken into consideration.

DR. JOHN COLEBATCH said that on clinical grounds it was difficult to rule out tuberculosis; the calcified nodules could not be overlooked and the failure of the Mantoux test was the only point against the diagnosis. He added that he had arranged to apply a tuberculin patch to the child's skin on the day following the meeting.

DR. L. P. WAIT asked whether it would be considered usual for an asymmetrical swelling to follow glandular enlargement alone.

Dr. Williams, in reply, said that at first the lesion had appeared to be tuberculous; but after having had the patient under observation for a month and failing to obtain a positive reaction to the Mantoux test, and as the patient had gained two pounds in weight, he thought there was considerable evidence against tuberculosis. Any chronic focal tuberculous lesion would cause the Mantoux test to produce a positive reaction in that time if it was properly carried out. The test had been properly made four times, and each time the result was negative. They had then to consider what was causing the block in the bronchus. It might be due to a coccal lesion associated with bronchopneumonia; but such a lesion would not bring about enlargement of the glands to the point of obstruction. It might be a mediastinal abscess; but enlarged glands from a coccal lesion in the lung rarely broke down to form an abscess. Low-grade mediastinitis might be present. Another possibility was the presence of a non-opaque foreign body. Dr. Williams supposed that ultimately time would tell which of these causes was operating. Ultimately the investigations with the bronchoscope and with iodized oil would be carried out; but the decision as to when they should be made was not easy.

Wire Collar Splint for the Neck.

DR. E. E. PRICE brought to the notice of members a wire collar splint with which the neck could be satisfactorily immobilized, for example, during the treatment of an inflammatory lesion. He said that the splint had been in use for more than eighteen months and had been of value in shortening the clinical course of cervical adenitis, both simple and tuberculous. Dr. Price showed four children to illustrate the way in which the splint fitted the neck and head, its applicability, and the nature of the benefit to be expected from its use.

The first child had had a cervical swelling for fourteen months, which became acutely active and fluctuant; from aspirated pus *Staphylococcus albus* was cultured. The splint had been applied at that stage and the gland had quickly subsided and healed. The second child had developed acute adenitis after tonsillitis; in four weeks a fluctuant area appeared under reddened skin. Immobilization was obtained by means of the collar and in three weeks the fluctuant area had resolved to form a firm nodule; but the main mass of glands took another five weeks to settle down to the size of ordinary palpable glands of the chronic inflammatory type. The third child had tuberculous adenitis, but the swelling was opened before the diagnosis was established; a dirty ulcer developed and persisted unaltered for three months. The head and neck were immobilized and the ulcer healed and was excised, the wound healing by first intention. The fourth child, who had recently come into Dr. Price's care, had tuberculous adenitis with sinus formation and was wearing one of the splints at the time of the meeting.

Dr. Price commented that the value of immobilization in checking inflammation and promoting healing of wounds was well known. In the neck it was admittedly difficult to immobilize the parts securely because of their extreme mobility and the tendency for movement to occur subconsciously. After mentioning that the wire collar splint had been evolved gradually in the splint shop at the Children's Hospital, Dr. Price claimed for it three advantages over the Thomas collar: (1) Immobilization was more effec-

tively obtained, as the splint fitted on the side of the head instead of just touching the mastoid processes, and it reached down over the shoulder for a short distance onto the chest and back. (ii) The splint was much cooler to wear, as it was of open construction. (iii) The open framework rendered it easy to apply dressings or without dressings to expose the wound to the air with the splint in position. Dr. Price added that the splint had also been used in the treatment of poliomyelitis involving the neck muscles and in the post-operative management of torticollis. He emphasized the point that the splint was not intended to be used to supplant operative treatment in tuberculous adenitis, in which excision was the method of choice; but he drew attention to the fact that by securing immobilization by the splint some lesions could be brought to a state suitable for operation. He added that in really acute cases associated with suppuration it was unlikely that the necessity for incision could be averted, though in convalescence by means of the splint recovery could be hastened and the appearance of the resultant scarring could be improved. In conclusion, Dr. Price mentioned that the degree of mobility possible with the splint in position was sufficient to render it unsuitable for such conditions as cervical fracture or tuberculous disease of the spine in the neck.

DR. W. J. MCKILLOP said that while working with Dr. Price he had noted that some of the results obtained with the use of the wire collar splint could only be described as miraculous. He had a clear recollection of the case of a boy with glands in the neck infected with cocci—a condition in which considerable suppuration leading to scarring seemed to be imminent; within one week of the application of the splint the danger of suppuration had been averted and by the end of two weeks the adenitis had almost subsided. Another example was that of a little girl who had tuberculous adenitis in the neck; a really excellent result was obtained. Dr. McKillop had used the splint in private practice with success and had formed the opinion that the recovery time could thus be cut down by one-half. Recently he had opened an infected sebaceous cyst in the neck and the lesion was subsiding rapidly. It was a very impressive splint and should be used extensively.

DR. H. DOUGLAS STEPHENS said that he too thought the splint was extraordinarily good; it was light and airy and kept the head immobilized very satisfactorily. He thanked Dr. Price for bringing it to the notice of the members, and considered that it would be useful for post-operative torticollis and all kinds of conditions.

DR. KENT HUGHES and DR. WILFRED FORSTER also expressed their thanks and approval.

DR. JEAN MACNAMARA commented that the splint was useful in preventing approximation of the ear to the shoulder in poliomyelitis. It had given her pleasure to hear emphasis placed on the value of rest in acute infection.

(To be continued.)

Post-Graduate Work.

WEEK-END COURSE IN MEDICINE AT SYDNEY.

THE New South Wales Post-Graduate Committee in Medicine announces that a week-end course in medicine will be held in the lecture hall at the Prince Henry Hospital, Little Bay, during the week-end July 26 and 27, 1941. The programme is as follows.

Saturday, July 26.

9.15 to 11 a.m.—In Ward 18, ward rounds: The Director of the Post-Graduate Medical Unit, Dr. S. A. Smith.
11.15 a.m.—"Chronic Arthritis": Dr. A. J. Collins.
12.15 p.m.—"Radiographic Appearances in Diseases of Joints": Dr. H. R. Sear.
2 p.m.—"Peptic Ulcer": Dr. A. Holmes à Court.
3 p.m.—"The Present Position of Hormone Therapy": The Director of the Post-Graduate Pathology Unit, Dr. F. B. Byrom.
4.15 p.m.—Pathological demonstration: Dr. F. B. Byrom.

Sunday, July 27.

9.15 a.m.—"The Present Position of Sulphanilamide Therapy": Dr. H. J. Ritchie.
10 a.m.—"Vitamins": Professor H. Priestley.
11.15 a.m.—"Sources of Error in the Diagnosis of Neurosis": Dr. S. A. Smith.

The fee for this course will be two guineas, except for medical officers of the defence forces on full-time service, who are invited to attend the whole or any part of the course free of charge. Applications for registration, accompanied by a remittance for the amount of the fee, must be made to the Secretary, New South Wales Post-Graduate Committee in Medicine, the Prince Henry Hospital, Little Bay.

The Royal Australasian College of Physicians.

EXAMINATION FOR MEMBERSHIP.

THE examination for Membership of the Royal Australasian College of Physicians will be held in Melbourne in August and September, 1941.

By-law 10, Section (2) states:

> The examination for Membership of the College shall consist of:
>
> (1) A paper on the Principles and Practice of Medicine, including Pathology, Therapeutics and the History of Medicine.
> (2) An oral examination, which may include the clinical examination of patients, together with the identification of naked-eye and microscopic specimens.

The written paper will be taken in capital cities where candidates are offering on Saturday, August 30, and the clinical examination will be conducted in Melbourne on Thursday, September 25, 1941.

Application forms may be obtained from the office of the College, 145, Macquarie Street, Sydney, and should be in the hands of the Acting Honorary Secretary at this address not later than Saturday, August 2, 1941.

Correspondence.

SYPHILIS IN PREGNANT WOMEN.

SIR: In reference to my article on syphilis in pregnancy published in your journal on April 8, 1941, I wish to acknowledge receipt of a private communication from Dr. J. E. Piper, of Geelong, drawing my attention to an article of his published in *The Australian Medical Journal* on February 22, 1913, giving the results of Wassermann tests on blood taken from 100 consecutive patients at the time of delivery of the baby. These tests were performed at the Women's Hospital, Melbourne, and gave positive results in eight cases, doubtful results in six cases, the remainder of the 100 results being negative.

I also wish to thank Dr. Dixon Hughes for drawing my attention to his article published in your journal on December 5, 1936.

Yours, etc.,
ELLA A. MACKNIGHT.

Melbourne,
June 3, 1941.

POST-WAR SHORTAGE OF MEDICAL PRACTITIONERS.

SIR: Today our profession is confronted by not only an immediate, but a future, post-war shortage of practitioners. I wish to advocate a constructive policy by which a desperate shortage may be averted in view of the fact that the present war may go on for another four years, according to American authorities, and now is the time to act with vision.

At the University of Melbourne there are said to be 260 students doing first-year medicine. These students are in the main prepared over later school years for assumption of a medical career, for which probably 80% are fitted. Owing to a bottleneck in the anatomy school, and this is the crux of the problem, only from 90 to 120 can be catered for in the second-year medicine. Should such gross wastage of potential material be permitted?

Today is a day of drastic improvisations, as the people of the British Isles realize in a manner beyond our remotely ruffled imaginations. It would be the simplest matter to arrange for two "shifts" each day in the anatomy and

physiological schools. Assistant professors of a younger and virile generation could take, say, a half-shift from 7 a.m. to 10 a.m., and a second half-shift from 5 p.m. to 8 p.m. Between these hours a second shift could be arranged, made up also of two half-shifts. By this the senior professor would have his present routine undisturbed. Two sets of bodies for dissection could be placed on marble slab wagons of braked dinner-wagon type, one set being parked when not in use. In the later years hospital clinics might be unwieldy, but war is also an unwieldy thing, and our complacency must adjust itself in practical planning which will be one more basic contribution to the war effort. Could this suggestion be placed before Major-General Maguire, Mr. R. G. Medley, vice-chancellor of the University of Melbourne, the deans of the Faculties of Medicine and the professors directly concerned in the matter?

Yours, etc.,
"HOME FRONT."

Melbourne,
June 9, 1941.

MEDICAL CERTIFICATION FOR MUNITIONS WORKERS.

SIR: At the present time it is very important that employees in munitions factories should lose as little working time as possible by absences from work. At all the larger Commonwealth factories medical officers are stationed who are in close touch with the factory management and who can usually arrange to obtain useful alternative employment for those who are injured and cannot return to their usual work but are not completely incapacitated. The cooperation of all members of the Association is requested in obtaining the return to work of all munitions workers as soon as reasonably possible.

It is especially requested that in cases of minor injury the employee should not be given a certificate stating that he is unfit for all work unless it is quite obvious that the injury is such that the factory medical officer will not be able to find any alternative employment.

Yours, etc.,
H. M. L. MURRAY,
Principal Medical Officer.

Ministry of Munitions,
Melbourne,
June 9, 1941.

VENEREAL DISEASE.

SIR: It has been officially stated that the number of men infected with venereal disease in all the British and Dominion armies during the Great War was 400,000. This, of course, does not include those who did not report.

It is now stated in the *American Journal of Social Hygiene* for March, 1941, that in the American Army in that war there were 340,000 reported cases—one man in every eleven contracted venereal disease.

The Surgeon-General of the United States Army is reported to have stated that 239,000 days were lost from absence from duty due to this cause last year. Colonel Hitchens, of the United States Medical Corps, states that during the Great War 1,700,000 days were lost from duty by the American Expeditionary Force.

A total of 740,000 men off duty gives cause for thought in the minds of those who realize the demand for medical officers, orderlies and supply services such gross infection demands. I know what it meant in Egypt.

Yours, etc.,
JAMES W. BARRETT.

103-105, Collins Street,
Melbourne,
June 17, 1941.

THE LATE GEORGE ADLINGTON SYME'S SERVICE IN EGYPT.

SIR: *Re* the venereal diseases hospital formed in connexion with Number 1 Australian General Hospital during the last war, it was Major E. Sandford Jackson, a surgeon of considerable experience, who was put in charge.

My father, recognizing the importance of early treatment for these cases to minimize loss of manpower and also to prevent after-effects on the race when these men returned to their civilian lives, gladly put his usual energy into the job ahead of him, and he was ably and loyally supported by Captain H. V. Foxton, who is now an ear, nose and throat specialist in Brisbane.

But what did irk my father was the many difficulties that were put in his way. Insufficiency of latrines, his inability to get mercury pills for the treatment of his syphilitics and his inability to get things done generally distressed him greatly. I knew something of the matter, because I was in Egypt at the time on my way to Gallipoli; but others that knew something of the troubles of those days, namely, Sir Stanley Argyle, Professor Archibald Watson, and my father, have passed on. However, I have his diary and other notes, dating from February 22, 1915, to April 9, 1915.

About that date he was transferred to Number 2 Australian General Hospital as surgeon, a position he held until pneumonia and empyema put him off duty.

As I knew the full story, I have been amused to hear in Victoria that Sir George Syme was put in charge of these cases (and in New South Wales a similar claim has been made at times concerning Sir Alexander MacCormick). However, what everybody meant to convey was that surgical skill was being wasted, when a less experienced man could have managed such a job.

Yours, etc.,
C. E. JACKSON.

Townsville,
Queensland,
June 18, 1941.

Naval, Military and Air Force.

NATIONAL SECURITY (MEDICAL CO-ORDINATION AND EQUIPMENT) REGULATIONS.

Control of Medical Equipment Order (Number 1).

THE attention of readers is directed to the following order in regard to the control of medical equipment, which has been received from the Collector of Customs, New South Wales.

In pursuance of regulation 7 of the National Security (Medical Co-ordination and Equipment) Regulations, I, Frederick Arthur Maguire, Chairman of the Central Medical Co-ordination Committee established under those regulations, acting upon the recommendation of the Medical Equipment Control Committee, hereby make the following order:

1. This order may be cited as the Control of Medical Equipment Order (No. 1).

2. The Control of Medical Equipment Order (No. 1) made on the fourteenth day of March, 1940, and published in the Gazette on the eighteenth day of June, 1940, is hereby revoked.

3. In this Order "specified drugs" means the drugs specified in the Schedule to this Order.

4. A person shall not sell any of the specified drugs by retail except on the written prescription or order of a registered medical practitioner, a registered veterinary surgeon or a registered dentist.

5. (1) Every medical practitioner who writes a prescription for any of the specified drugs shall endorse on the prescription the quantity to be dispensed and the number of times which, in his opinion, it will be necessary to dispense the prescription.

(2) Every person who dispenses the prescription shall cause his name to be indelibly marked thereon by stamp or other means.

(3) If a prescription for any of the specified drugs does not bear an endorsement of the number of times which it will be necessary to dispense it, the prescription shall not be dispensed more than twice.

(4) The person who dispenses the prescription on the last occasion, as determined in accordance with the preceding sub-paragraphs, shall stamp, mark or inscribe in durable and legible letters across the face of the prescription the word "Cancelled".

(5) A person shall not dispense a prescription for any of the specified drugs if—

(a) the prescription has been marked "Cancelled" in accordance with the last preceding sub-paragraph; or

(b) he has reasonable cause to believe that the prescription has already been dispensed the maximum number of times permitted under this Order.

(6) Every pharmaceutical chemist shall keep in his prescription book a record of all specified drugs which have been dispensed by him, the name and address of each person to whom such drugs were supplied, and the quantity of drugs supplied to each person, and shall, upon demand by an authorized officer, produce his prescription book for examination by that officer.

The Schedule.

Sulphonamides and preparations allied to or derived from sulphonamides, whether described as 693 M & B, Prontosil Album, Streptocide, Colsulanyde, Prontosil Red, Proseptasine, Soluseptasine, or by any other Trade Name.

Dated this twenty-ninth day of April, 1941.

F. A. MAGUIRE, Major-General,
Chairman, Central Medical Co-ordination Committee.

APPOINTMENTS.

THE undermentioned appointments, changes *et cetera* have been promulgated in the *Commonwealth of Australia Gazette*, Number 118, of June 19, 1941.

AUSTRALIAN IMPERIAL FORCE.

Australian Army Medical Corps.

The undermentioned officers are transferred from Reinforcements from the dates shown.—Captains K. H. Tepper with regimental seniority next after Captain A. H. London, 31st May, 1940; W. H. Campbell with regimental seniority next after Captain J. C. English, 15th June, 1940, G. M. Turnbull with regimental seniority next after Captain J. M. Yeates, 20th July, 1940; T. J. Ritchie, R. Maltby, F. N. Street, J. M. Oldham, R. H. Kaines, A. V. Day, M. L. Edwards, F. G. Meyer, W. P. Ryan, K. W. Priddis, G. Archbold, T. K. Abbott and U. L. Brown, 3rd February, 1941; and S. Rose, E. J. K. Harbison, J. S. Stewart, R. K. Wilson, D. G. Alsop, F. W. Farmer, J. W. Sangster, T. C. Anthony, F. W. Williams, J. W. H. Merry, H. Smith, C. E. Sawrey and R. S. Lawson, 5th February, 1941.

ROYAL AUSTRALIAN AIR FORCE.

Citizen Air Force: Medical Branch.

Flight Lieutenant K. A. McLean is transferred from the Reserve to the Active List, with effect from 9th May, 1941.

Jack De Vidas, M.B., B.S., D.T.M., is appointed to a commission on probation with the rank of Flight Lieutenant, with effect from 19th May, 1941.

Reserve: Medical Branch.

Flight Lieutenant F. R. Vincent relinquishes his commission, with effect from 17th May, 1941.

Flying Officer H. H. Jackson, M.B., B.S., is transferred from the Reserve General Duties Branch to the Reserve Medical Branch with the rank of Flight Lieutenant, with effect from 19th May, 1941.—(Ex. Min. No. 90—Approved 18th June, 1941.)

CASUALTIES.

ACCORDING to the casualty list received on June 20, 1941, Lieutenant-Colonel L. E. Le Souef, A.A.M.C., of South Perth, Western Australia, Major J. D. Palandri, A.A.M.C., of Mount Lawley, Western Australia, Captain M. Mayrhofer, A.A.M.C., of Merredin, Western Australia, Captain A. J. King, A.A.M.C., of Victoria Park, Western Australia, and Captain R. A. Playoust, A.A.M.C., of Mosman, New South Wales, are reported missing. Lieutenant-Colonel D. M. Salter, A.A.M.C., of Morphet Vale, South Australia, previously reported missing, is now reported rejoined unit.

According to the casualty list received on June 25, 1941, Captain W. W. Gunther, A.A.M.C., of Sydney, is reported missing.

University Intelligence.

THE UNIVERSITY OF SYDNEY.

Professor D. A. Welsh.

PROFESSOR DAVID ARTHUR WELSH occupied the chair of pathology in the University of Sydney from 1902 to 1936.

Shortly after he retired, his successor, Professor W. K. Inglis, suggested that a fund should be opened to commemorate Professor Welsh's work. This was done and a number of his friends and former pupils subscribed. Not a large sum was collected because, as one of Professor Welsh's friends explained, he thought the occasion premature.

The amount subscribed was approximately £160.

In writing to Professor Inglis late last year, Professor Welsh used these words: "Now an occasion has arisen when, in the words of Mr. Winston Churchill, sacrifices must be made by all if we are to save our lives, and, what is far more precious than life, the grand human causes which we in our generation have the supreme honour to defend. I ask no better memorial than to be allowed to share in that honour with my friends by giving their money to the aid of Britain in her hour of high endeavour and deadly peril."

Originally Professor Welsh wished this money to be sent to Scotland and given to an Edinburgh fund being used for the purchase of "Hurricanes" and "Spitfires". All the subscribers to the memorial have expressed their willingness to use the money in the way indicated. The money collected from the subscribers was originally intended for the purchase of a portrait of Professor Welsh; a benefactor, however, had arranged for the portrait to be painted.

This fine gesture on the part of Professor Welsh is appreciated very highly in university circles. A cheque for £160 has been sent to Mrs. W. J. Dakin, who is organizing the science graduates and undergraduates of the university in an endeavour to collect money for the purchase of aeroplanes for the nation.

MEDICAL WAR RELIEF FUND.

THE following is a ninth list of contributions to the Medical War Relief Fund established by the Federal Council of the British Medical Association in Australia for the relief of distressed medical practitioners in Great Britain.

New South Wales.

£20: Dr. G. A. M. Heydon.

£10 10s.: Anonymous, Dr. H. R. R. Grieve, Dr. A. J. Hood Stobo, Dr. F. McCallum.

£5 5s.: Colonel A. M. McIntosh, Dr. A. L. Dawson, Dr. A. J. Gibson, Dr. E. W. Frecker, Dr. W. W. Cameron, Dr. F. C. Yarad, Dr. R. S. Godsall, Dr. H. E. Lee, Dr. H. G. Holmes, Dr. N. W. M. Hughes, Dr. C. R. Laverty.

£5: Lieutenant-Colonel W. Wood, Dr. W. J. Stack.

£3 3s.: Dr. H. H. Jamieson, Dr. C. Davis, Dr. A. S. Curtin, Dr. A. H. Macintosh, Dr. D. G. R. Vickery, Dr. R. M. Bowman, Dr. J. Pirie, Dr. F. W. Buddee, Dr. R. B. Lynch and Dr. R. S. Irwin (last three, joint contribution), Dr. R. A. Fairley, Colonel W. Vickers.

£3: Dr. W. G. Armstrong.

£2 2s.: Dr. A. T. Roberts, Dr. Sylvia D. Bray, Dr. A. S Boyd, Dr. A. L. Lance, Dr. N. S. Solomons, Dr. G. B. Downes, Dr. R. C. Traill, Dr. C. H. Northcott, Dr. H. Solomon, Dr. C. E. M. Gunther, Dr. Brenda A. Mitchell, Dr. C. J. Downes, Dr. H. M. North, Dr. O. J. Ellis, Dr. J. Dawson, Dr. M. Sofer Schreiber, Dr. W. C. Smith, Dr. R. S. Steel, Dr. R. I. Campbell, Dr. S. W. G. Ratcliff, Dr. C. Nigel Smith, Dr. E. P. Armstrong, Dr. G. J. Duncan, Dr. R. A. R. Green, Dr. W. S. Donaldson, Dr. K. G. Hearne.

£1 1s.: Dr. M. W. Ginsberg, Dr. Frances C. B. McKay, Dr. J. P. Findlay, Dr. J. B. Birch, Surgeon-Lieutenant D. A. Warden, Dr. W. K. Dale, Dr. H. H. Harrison, Dr. F. J. Williams, Dr. J. Levy, Dr. N. H. Meacle.

South Australia.

£10 10s.: Dr. Phoebe Chapple, Dr. H. K. Pavy.

£10: Dr. J. D. Mill.

£2 2s.: Dr. W. H. Carden, Dr. O. T. Piper (second contribution).

£1 1s.: Dr. D. MacDonald Steele, Dr. F. W. A. Ponsford, Dr. Ruth Mocatta.

Western Australia.

£4 4s.: Anonymous.

£2 2s.: Dr. H. C. Callagher, Dr. A. F. Walsh.

£1 1s.: Dr. M. B. Johnson.

Obituary.

JOHN FERGUSON CHAMBERS.

DR. H. F. MAUDSLEY has forwarded the following appreciation of the late Dr. John Ferguson Chambers.

May I be allowed to add a few words in appreciation of the late Dr. J. F. Chambers.

I first knew Jack intimately when we were doing post-graduate work in London in 1921-1922. He was a man who was incapable of doing anything badly, whether at work or at sport. He was unassuming to a degree, had the highest ideals, and was a most charming companion. There are perhaps not many who know that Chambers was a sort of hero at Saint Thomas's Hospital, not only because

of the sterling work that he did under the late Professor McLean, but because of his brilliance as a rugger player—he was one of the mainstays of Saint Thomas's team.

On his return to Melbourne he was one of a band of a few of us who called ourselves the "polymorphs". We met in each of our houses once a month and discussed problems connected with our work—a habit which alas faded away in latter years. At these meetings Jack was an extraordinarily keen debater and showed all the qualities of a discerning and able physician. Owing to his diffidence he was seldom heard at scientific meetings, though his remarks in private concerning a discussion could be pungent and illuminating to a degree. He hated anything that was meretricious or pretentious, and scorned the showman who could not deliver the goods.

He had many responsibilities outside his professional life, which made it difficult for him to go away. His sense of duty made the call of his country the first consideration. The profession and the community are the poorer for his departure, and to some of us who were privileged to be his friends, there is a gap that can never be filled.

HARRY CLARENDON WHITTLE.

WE regret to announce the death of active service of Major Harry Clarendon Whittle, of the Australian Army Medical Corps.

Notice.

THE next meeting of the Medical Board of the Royal Prince Alfred Hospital, Sydney, will be held on Tuesday, July 8, 1941, at the hospital, in the A2 lecture theatre. The clinical section will last approximately one hour and will commence at 4.30 o'clock p.m. The meeting will take the form of a seminar by the New South Wales Post-Graduate Committee in Medicine. Mr. H. R. G. Poate will deal with liver function tests, and Dr. S. A. Smith with liver therapy. Medical practitioners are invited to be present.

Medical Appointments.

Dr. James Augustus Wall has been appointed Government Medical Officer at Narrandera, New South Wales.

Dr. John Allan Thoms has been appointed Government Medical Officer at Millthorpe, New South Wales.

Dr. Francis James Horan has been appointed Government Medical Officer at Mungindi, New South Wales.

Dr. Robert Leslie Gough Elcoate has been appointed Government Medical Officer at Cloncurry, Queensland.

Dr. John Edward Overstead has been appointed Government Medical Officer at Thursday Island.

Dr. Emanuel Sydney Morris has been appointed Director-General of Public Health, Chief Medical Officer of the Government, President of the Board of Health, Inspector-General of Hospitals and Charities, Commissioner under the Venereal Diseases Act, 1918, and Inspector-General of Mental Hospitals of New South Wales.

Dr. Hubert Melville Jay has been appointed Honorary Consulting Laryngologist for Tuberculosis Services at the Royal Adelaide Hospital.

Dr. Lionel Oxborrow Betts has been appointed Honorary Consulting Orthopædic Surgeon for Tuberculosis Services at the Royal Adelaide Hospital.

Dr. Oswald Bertram Lower has been appointed Honorary Clinical Assistant to the Medical Section at the Royal Adelaide Hospital.

Dr. Harold Richard Hugh Noel Oaten has been appointed Honorary Medical Officer, Mount Gambier Hospital, South Australia.

Books Received.

"The Medical Aspect of Boxing", by E. Jokl, M.D.; 1941. Pretoria: J. L. van Schaik, Limited. Demy 8vo, pp. 251.

"The Pharmacology of Anesthetic Drugs: A Syllabus for Students and Clinicians", by J. Adriani, M.D.; Second Edition; 1941. Springfield: Charles C. Thomas. Demy 4to, pp. 95, with illustrations. Price: $3.50 net.

"Training for Childbirth, from the Mother's Point of View", by M. Randell, S.R.N., S.C.M., T.M.M.G.; 1939. London: J. and A. Churchill. Foolscap 4to, pp. 164, with 118 illustrations. Price: 12s. 6d. net.

"How the Body Works", by L. S. Michaelis, M.D.; 1940. London: Longmans, Green and Company Limited. Foolscap 4to, pp. 80, with illustrations. Price: 2s. net.

Diary for the Month.

JULY 8.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
JULY 8.—New South Wales Branch, B.M.A.: Organization and Science Committee.
JULY 8.—Tasmanian Branch, B.M.A.: Branch.
JULY 10.—Victorian Branch, B.M.A.: Ethics Subcommittee.
JULY 11.—Queensland Branch, B.M.A.: Council.
JULY 14.—Victorian Branch, B.M.A.: Hospital Subcommittee.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Honorary Secretary, 135, Macquarie Street, Sydney): Australian Natives' Association; Ashfield and District United Friendly Societies' Dispensary; Balmain United Friendly Societies' Dispensary; Leichhardt and Petersham United Friendly Societies' Dispensary; Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney; North Sydney Friendly Societies' Dispensary Limited; People's Prudential Assurance Company Limited; Phœnix Mutual Provident Society.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federated Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17): Brisbane Asociated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178, North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205, Saint George's Terrace, Perth): Wiluna Hospital; all Contract Practice appointments in Western Australia.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

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Members and subscribers are requested to notify the Manager, THE MEDICAL JOURNAL OF AUSTRALIA, Seamer Street, Glebe, New South Wales, without delay, of any irregularity in the delivery of this journal. The management cannot accept any responsibility or recognize any claim arising out of non-receipt of journals unless such a notification is received within one month.

SUBSCRIPTION RATES.—Medical students and others not receiving THE MEDICAL JOURNAL OF AUSTRALIA in virtue of membership of the Branches of the British Medical Association in the Commonwealth can become subscribers to the journal by applying to the Manager or through the usual agents and booksellers. Subscriptions can commence at the beginning of any quarter and are renewable on December 31. The rates are £2 for Australia and £2 5s. abroad *per annum* payable in advance.

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Table of Contents.

[The Whole of the Literary Matter in THE MEDICAL JOURNAL OF AUSTRALIA is Copyright.]

ORIGINAL ARTICLES— Page.
Mass Radiography of the Thorax, with Special Reference to its Application to Recruits for the Army, by Bruce White 23
Mass Radiography of the Chest, by B. P. Anderson Stuart, M.B., Ch.M., F.R.A.C.P. 27
The Changing Scene in Medicine: Van Diemen's Land, 1803 to 1853, by W. E. L. H. Crowther .. 29

REVIEWS—
Early Treatment in Psychiatry 34

LEADING ARTICLES—
Penny Wise and Pound Foolish: An Australian Army Failure 35

CURRENT COMMENT—
Hans Zinsser and his Studies on Typhus Fever .. 36
Economy in the Laboratory 37
"Mr. Punch" a Hundred Years Old 37

ABSTRACTS FROM MEDICAL LITERATURE—
Bacteriology and Immunology 38
Hygiene 39

BRITISH MEDICAL ASSOCIATION NEWS—
Scientific 40

POST-GRADUATE WORK—
Course in Pædiatrics at Sydney 41
Course in Anatomy and Physiology at Sydney .. 42
Notice 42

MEDICAL PRACTICE—
The Treatment of Persons Suffering from Electric Shock 45

CORRESPONDENCE— Page.
Insulin and "Cardiazol" in the Treatment of the Psychoses 42
A Method of Covering Skin Grafts 43
The Effect of Œstrogenic Substances on the Kidney of Trichosurus Vulpecula 43
"Alcoholics Anonymous" 43
Hospitals and their Executive Officers 44
Cryptotrophic Factors in Nutrition 44
Oral Vaccines 44
British Medical Association Assistance to Members on Military Service, Brisbane 45
Wellcome's Medical Diary 1941 45

NAVAL, MILITARY AND AIR FORCE—
Appointments 46
Decorations 47
Casualties 47

MEDICAL WAR RELIEF FUND 47

OBITUARY—
Norman Josiah Solomon 47
Allan Douglas Gillies 47
Charles Eric Watson 48
Francis Antill Pockley 48

NOMINATIONS AND ELECTIONS 48

AUSTRALIAN MEDICAL BOARD PROCEEDINGS—
Queensland 48
Tasmania 48

BOOKS RECEIVED 48

DIARY FOR THE MONTH 48

MEDICAL APPOINTMENTS: IMPORTANT NOTICE .. 48

EDITORIAL NOTICES 48

MASS RADIOGRAPHY OF THE THORAX, WITH SPECIAL REFERENCE TO ITS APPLICATION TO RECRUITS FOR THE ARMY.[1]

By BRUCE WHITE,
Sydney.

THE introduction early in January, 1940, of routine radiological examination of the chest for all members of the Australian Imperial Force by the miniature fluoro-photographic method was at the time an experiment in this country, but one which in my opinion has been amply justified by the results.

Soon after Röntgen's original discovery about forty years ago attempts to take photographs of the fluorescent screen were made, and experiments were continued for many years; but it was not until 1934 that de Abreu[(1)] was successful. He made the first successful survey of the thorax in 1936. Since then mass radiography has gradually been introduced in most countries of the world and reports of its successful use have been made by many; these include Dormer and Collender,[(2)] Douglas and Birkelo (who used five by four inch film),[(3)] Bentley and Leitner,[(4)] Holfelder and F. Berner[(5)] in Germany (quoted by Bentley and Leitner), Cooper,[(6)] and others.

It has gradually become evident to those interested in chest diseases that an indispensable aid to the diagnosis of lung disease is radiology. But to many of the profession in all parts of the world there is still an astonishing lack of appreciation of this fact. To me it is most astounding that many controversial letters on the subject are appearing in the latest copies of medical journals on the other side of the world. Let me quote Jones:[(7)]

[1] Read at a meeting of the New South Wales Branch of the British Medical Association on May 29, 1940.

It is a generally accepted fact today that moderately advanced pulmonary tuberculosis, even with cavitation, may be missed on clinical examination, and that it is a common occurrence to find early tuberculous disease without associated clinical signs. This is so well known as not to require discussion.

Mass radiography of an army, particularly one of the magnitude of the British Army, introduces many difficulties; but as a "chest clearance" cannot be given without an X-ray examination, these must be overcome. One of the major objections to routine chest examination is that of cost. I cannot in this paper consider actual details of costs, nor indeed many of the technical aspects, matters which will be fully dealt with by my radiological colleagues. I am, however, convinced that the small film examination for mass survey work has forever ruled out this bogy.

The material for this paper has been obtained from a personal study of many thousands of radiological examinations of members of the Australian Imperial Force in the Eastern Command. It is therefore proposed to describe the routine method which is now adopted in the investigation of the chests of recruits in Sydney.

Each applicant has an X-ray photograph of his chest taken immediately after medical examination. The films are developed on the same day and read at 8 a.m. on the next day. All men whose films show suspicious shadows are immediately sent for and in most cases are at the depot by 10 a.m. Large films are then taken and are ready to be seen in the wet state by the members of the chest board at 11 a.m. A full history of the men is taken and a clinical examination is then made, and all in whom tuberculosis is suspected are immediately referred to the pathologist for a Mantoux test and an estimation of the blood sedimentation rate. On the following morning the men, without having partaken of food or fluid, report for gastric lavage. The contents removed from the stomach are examined for acid-fast bacilli. On the next day at 11 a.m., recruits again report to the chest board for final

consideration. The Mantoux test reactions are read, and after consideration of the history and of the clinical, pathological and radiological data, the chest board determines whether the applicant is fit to remain in the army. All tuberculous rejects are referred to the Director of Tuberculosis.

With the omission of all technical radiological details, the foregoing is a brief résumé of the present routine method adopted. It can be fairly claimed that no applicant is rejected without very full investigation and after very careful consideration.

The organization necessary for the quick disposal of recruits has taken many months to evolve. Much just criticism of the system has been raised in the past. When the decision to introduce radiography of the chest for all members of the Australian Imperial Force was first made, about December, 1939, a large number had already been in the army for three or four months. The first batch, of approximately 9,000 men, was radiologically examined in the final week before embarkation early in January, 1940. Many recruits suspected of chest disease, who were examined by a medical board on the day before embarkation, succeeded by fair means or foul in embarking. These men were eventually traced and brought back to Australia, some with extensive and advanced disease. Let it be stated at once that their embarkation was not due to the failure of the microradiographical examination.

With the adoption of full-scale recruiting in April, 1940, routine radiological examination was introduced when applicants applied. All films, totalling as many as 1,500 per day, were read either on the next day or two days later, according to the services given by the companies responsible for the developing. It had been the hope of the medical officers in charge of recruiting that the recruits would be kept in a depot before absorption to units, which are scattered all over the Commonwealth. This, unfortunately, was not carried out, and for a multitude of reasons suspects repeatedly sent for were not brought before the chest board for periods varying from two days to six months. As a result of this delay in reporting, much criticism of the 35 millimetre film examination followed. During the period from April to November, 1940, I can recall approximately 20 men notified from various sources as suffering from pulmonary tuberculosis who had not been discharged from the army. In every case investigation revealed that these men had been noted on the small film list for reexamination, but had not reported. Gradually the system of examination as outlined has been adopted, and in the vast majority of cases it is now working efficiently.

Interpretation of the Small Films.

The standard of the small film has been, on the whole, satisfactory for diagnostic purposes. Very wisely it has been laid down that all suspicious cases must be checked again with the 17 inch by 14 inch films, which show more detail than most of the small films. At a recent meeting of the Radiological Association, at which a critical study was made of both miniature and large films, there was no doubt in the minds of those present that the large film was the ideal one for revealing normal and abnormal shadows in the thorax. However, provided the small film is reasonably clear, I consider it unlikely that abnormal shadows will be missed.

In the course of a survey of many thousands of men, a large number of abnormalities have been found. Tuberculosis, of course, is the outstanding disease, and routine radiography has been introduced primarily to detect such cases; but many other abnormalities have been noted, and some of outstanding interest I propose to discuss later.

In the routine reading of the films, it has been found after many months of trial that a small projection, approximately seven by five inches, is ideal. This allows of good illumination, and furthermore the chest as a whole can be kept in focus. There have been varying opinions of the rate at which films may be satisfactorily examined. Much depends on the quality of the films. I am convinced, however, after repeated checking, that with films of good quality, 400 to 500 per hour is a very fair and satisfactory rate of examination. I do not advocate, though, such a rate for a person inexperienced in the reading of the small films, the interpretation of which requires much experience and judgement.

In mass radiography, small films have been used to pick out abnormal shadows and not for critical analysis; that is left for study on the large film taken at reexamination. In small films of poor quality it has been difficult to analyse details, especially in the apical and axillary regions. Crowding of the rib shadows at the apices in many films even of better quality is sometimes difficult to analyse, and has often called for reexamination on a large film with negative results. It has been found that the proportion of reexaminations has diminished with more experience in reading. Increased markings in the lower zones also tend to be exaggerated on the small film, and in a number of cases bronchiectasis has been suspected, but proved non-existent after further radiological and clinical examination. Indeed, my impression has been that most abnormal shadows in the lung fields are exaggerated on the miniature film, and with reasonable care are unlikely to be missed. Up to the present time, of the many thousands radiologically examined in the Eastern Command, four soldiers who have since been found to be suffering from pulmonary tuberculosis were not discovered at the initial radiological examination. In two of these cases a very critical examination by a number of qualified practitioners failed to detect any evidence of the abnormality in the 35 millimetre film. In the third case it was possible to see in retrospect where the lesion had started, but again several of my colleagues indicated that they would have passed the film. In the fourth case, the lesion was certainly visible and should have been noted. The only extenuating feature was that the film was light, particularly towards the axillary margin, where the lesion was situated.

Particularly in the early days, and in the great rush of the middle period of 1940, a large number of technical faults were in evidence and still occur occasionally. Here the human element enters, and has been one of the major difficulties with which to contend. Failure of the operator to turn the film has led to two exposures. Faulty development and faulty exposure due to failure to take cognizance of the build of the recruit have also produced unsatisfactory films. These technical faults are very quickly recognized and so labelled. In the past an unduly large number of men whose films were labelled "T.F." embarked without subsequent checking, and there is no doubt that a small percentage of these will at some future date be repatriated on account of pulmonary disease.

Analysis of Films.

I propose now to give an analysis which was completed several months ago of 40,000 films. These films were critically reviewed with the help of my colleagues, Dr. Cotter Harvey and Dr. W. L. Calov, and involved many days' work. Owing to the former's departure for service overseas and to pressure of routine work, I regret that a further review of many thousands of films has been suspended. All these films have, of course, been read, suspects have been "boarded" and records have been kept; but unfortunately the further review and analysis have not been possible. The material is all available for research work, possibly in the post-war period.

In 40,000 film examinations, 365 cases of tuberculosis were found—that is, 0·91%. This figure very closely tallies with that found in the Canadian survey—that is, about 1%. Of this number, approximately 156 (0·39%) were designated "possibly active", and 209 (0·52%) "possibly inactive".

In Table I the numbers of other abnormalities detected are shown, a total of 81 in 40,000 examinations, or 0·2%. In addition to these, there were noted innumerable minor rib abnormalities, such as bifid ribs, cervical ribs, maldeveloped first ribs, old fractures of ribs and clavicles, excessive calcification in rib cartilages, and rib resections. Numerous calcified primary tuberculous foci, foreign

TABLE I.

Examination of 40,000 Miniature Films (Australian Imperial Force): Abnormalities other than Pulmonary Tuberculosis.[1]

Abnormality.	Number.
Neoplasm and hilar gland enlargements	12
Pneumonia and pneumonitis	21
Bronchiectasis	3
Pneumokoniosis	4
Pulmonary fibrosis	2
Hydatid disease	10
Gross heart lesions	5
Eventration of diaphragm	4
Lung abscess	2
Old injuries to chest	4
Muscle abnormalities	4
Calcified axillary abscess	1
Calcified cervical glands	2
Thoracic goitre	2
Ganglioneuroma	2
Gross rib abnormality	3
Total	81

[1] In addition three cases of congenital dextrocardia were noted, and many azygous lobes.

bodies and many azygous lobes were also seen. In a number of cases of fusion of ribs and bifid ribs the appearances were doubtful and checking with large films was required; but in the vast majority of cases these minor abnormalities were clearly detected on the small film. In this series 768 (1·92%) large films were taken to check or confirm the abnormalities in doubtful cases.

It will be observed that there were 21 cases of pneumonia or pneumonitis. Most of these were found during the "Ingleburn throat" epidemic—the severe tracheo-laryngo-pharyngeal infection which occurred in all military camps in Australia in July and August, 1940. This infection was commonly designated as "Ingleburn throat" or "Greta bark" or "Puckapunyal throat", according to the locality. These cases all fit into the category of "ambulatory pneumonia'. This incidence of "ambulatory pneumonia" has been noticed in the Canadian series.

Discussion.

The main reason for the introduction of routine X-ray examination of the Australian Imperial Force has been to detect pulmonary tuberculosis. Why has this been considered necessary? Undoubtedly the outstanding reason has been and is that of pension costs. It has been estimated that tuberculosis during and after the last war has already cost the Government of the United States of America the sum of $900,000,000 (Spillman),[6] and the Canadian Government $125,000,000 (Jones).[7] Similar Australian figures are not available; but the Chairman of the Repatriation Department, to whom I am greatly indebted, has supplied me with the following information:

In Table II the number of men receiving pensions on account of pulmonary tuberculosis each year from 1924 to 1940 is shown—an average of 2,558 *per annum*. Apart from moneys paid to dependants and cost of medical treatment, it is estimated that the amount of pensions payable to each soldier has averaged £160 *per annum*. Therefore an amount of £6,876,320 has been paid in the seventeen years to pensioners alone. This amount, together with the millions of pounds paid to dependants, makes a formidable total.

I should think that the expense to the country of each tuberculous soldier and his dependants might be approximately estimated at £3,000. Therefore, in this series of 40,000 films, a saving of £1,095,000 in pensions might be a fair estimate. So the potential saving to the Commonwealth Government for the whole of the second Australian Imperial Force must run into millions of pounds, and for this reason alone the use of mass radiography has more than justified itself. But there are other important aspects. One is the risk that service conditions may activate an undetected lesion—a most unfair risk to the individual concerned. Another is the risk of infection by those suffering from active pulmonary

TABLE II.

Year Ended.	Number of Men Receiving Pensions for Pulmonary Tuberculosis.
June 30, 1924	2,185
June 30, 1925	2,193
June 30, 1926	2,245
June 30, 1927	2,675
June 30, 1928	2,827
June 30, 1929	2,902
June 30, 1930	2,924
June 30, 1931	2,867
June 30, 1932	2,674
June 30, 1933	2,585
June 30, 1934	2,518
June 30, 1935	2,484
June 30, 1936	2,432
June 30, 1937	2,403
June 30, 1938	2,391
June 30, 1939	2,385
June 30, 1940	2,307

tuberculosis living in contact with their fellows in confined spaces in barracks. There has raged for many years a controversy concerning adult infection. One school has asserted that all adult disease has been due to reactivation from a primary infection in early childhood, contracted by association with another member of the family, usually one of the parents. Another school has just as vigorously proclaimed that adult infection is *per se* a new disease contracted by close association with a sufferer from the disease—in other words, endogenous *versus* exogenous infection. The work of D'Arcy Hart, Hilton and Morland,[9] Wingfield,[10] Hetherington and McPhedran,[11] and of many of our own contemporaries in this country, including Dr. John Storey, has surely proved that there is truth in both theories, and there can no longer be any shadow of doubt that massive infection by an adult suffering from pulmonary tuberculosis will claim a percentage of victims. Hence the importance of locating all possible sufferers in the army to prevent spread of the disease.

It must be stressed, however, that radiological examination, no matter how carefully it is carried out, and no matter what technical method is employed, is not absolutely fool-proof. In the last few years, I have knowledge of at least six patients whose original skiagrams showed no abnormal shadows, yet whose sputum contained tubercle bacilli. A number of men will undoubtedly develop pulmonary tuberculosis during army service—men who have at the time of enlistment no radiological evidence of any disease, and for that matter who have no tubercle bacilli in their sputum. On the other hand, I venture to assert that the number will not be unduly large; but, of course, time alone will decide.

One of the most important aspects of a mass radiological survey is undoubtedly the interpretation of abnormal shadows noted in the films. This aspect has been most illuminating, and one of very great difficulty to members of the chest board. I have on numerous occasions stressed the importance of interpreting radiological shadows in terms of pathological changes. For the past twenty years I can recall many of our profession preaching the gospel of the study of pathology as the beginning and the end of medical science; but it would appear that many still forget too lightly the underlying disease process of the ills to which man is heir. I think that Watt's[12] classification of radiological shadows as outlined in *Tubercle* is the ideal. In this an endeavour is made to visualize the lesions in terms of exudation, productive infiltration, fibrosis, calcification and cavitation, and after full survey of all history, clinical data and the results of pathological tests, a more accurate estimate of the underlying morbid condition may be made. True it is that in very many cases we only make guesses; but at least we are endeavouring to make a higher percentage of correct guesses. I deprecate extremely the bald statement that the patient has "T.B. of the right apex", or some similar report. Unfortunately we have seen quite a number of patients so

labelled who have subsequently been proved to be non-tuberculous. As an example I instance the case of I.R.

This patient, a young woman, complained of tiredness and a cough, of ten days' duration. She remained at work, but sought medical advice because her symptoms persisted. A skiagram of her chest showed increased markings in the right upper zone, which appeared to be "typical" of a fibro-exudative type of tuberculosis. There was no response, however, to the Mantoux test. This was repeated three times, and the same result was obtained on each occasion. A further skiagram taken six weeks later revealed no abnormal shadows. Undoubtedly this was a case of "ambulatory pneumonia".

At one of the tuberculosis clinics in Sydney a recent review of 110 consecutive cases revealed that in 10 of these a radiological diagnosis of tuberculosis was made and subsequently shown to be incorrect. This is matter for serious thought and consideration.

Again, the question of activity of radiological lesions is another vexed question, and one about which controversy has raged for many years. This has been a source of much interest to members of the chest board. Dr. Reginald Webster's recent communication to the Royal Australasian College of Physicians I am sure has been a revelation to many.[1] In his work Dr. Webster has cultured tubercle bacilli from material taken from a large number of patients with so-called inactive pulmonary tuberculosis. The work is continuing, and the full results are yet to be published; but they already confirm in a striking manner the fact that it is impossible to state from the appearance of an X-ray film that a tuberculous lesion is healed. I hope that it will have been noticed that in my classification of "active" and "inactive" lesions previously given, these are qualified by the word "possibly".

Intimately bound up with the interpretation of the films has been the final "boarding" of men suspected of chest disease. Decisions as to fitness or otherwise for army service have indeed been made with the greatest difficulty in many cases. This brings up the all-important question of standards—whether any recruit showing evidence of past tuberculosis should be accepted for service or not. At the outset it has been agreed by all that those showing "healed" primary tuberculous infection, such as the typical Ghon's focus, may be passed without question. But concerning those showing any evidence of the reinfection type of disease or "adult" type, or secondary, or tertiary infection—whichever classification is adopted—there is scope for much argument. As a general rule, for military purposes I am strongly of the opinion that all such men should be rejected, and this view has been shared by other members of the chest board. This applies to all men, even if the lesion appears to be "healed". For practical purposes in civil practice I have usually regarded lesions showing calcification as the true criterion of arrest; but it is recalled that Wingfield once remarked that no patient may be said to be cured of tuberculosis until he is safely dead of another disease. Also Aronson and Opie[(32)] and others have grown tubercle bacilli from calcified nodules. However, I think the risk that tubercle bacilli may escape from the centre of a calcified nodule is not very great. The question of standards has exercised the minds of all those sitting on chest boards, both in this State and in other States of the Commonwealth. Last year I suggested certain standards for the chest board in Sydney, and for a short period these were adopted. Briefly they were as follows. No recruits showing evidence of the reinfection type of tuberculosis, active or inactive, should be accepted for overseas service. When there was no clinical or pathological evidence of activity, the following might be accepted for home service, subject to repeated X-ray examination: (i) those in whose skiagrams appeared an area of calcification no greater than three-eighths of an inch in diameter (approximately), or three similar calcified nodules aggregating this amount; (ii) those in whose skiagrams appeared an area of fibrosis, equivalent to an area one inch in diameter. This latitude was intended only for those required either for special duties or for clerical work, and provided the subject was aged over forty years. The reasons activating this decision were the following: (*a*) Subjects aged over forty years would be less likely to suffer recrudescence. (*b*) The type of work would not necessarily be strenuous and the risk of breakdown would consequently be less. (*c*) The possibility of reactivation with these minimal lesions would not be very great. In the case of a subject with multiple calcified foci in a lung field, the chances of recrudescence would be more than in that of one with two or three small foci.

From a military point of view, however, the adoption of this standard is not desirable. After all, the work of the army must continue without increased medical burdens, and every such recruit retained means frequent observation and "boarding". It is, however, my considered opinion that there are some men affected by what might be reasonably considered inactive lesions who are required for key positions, and who should be retained in the army despite the possibility of aggravation of their tuberculous lesion. But, of course, this is a question to be decided by higher military authorities and not by a medical board.

[1] See leading article, THE MEDICAL JOURNAL OF AUSTRALIA, May 10, 1941.

Summary and Conclusion.

1. A description of the routine examination by the miniature fluorophotographic method of applicants for the Australian Imperial Force has been recorded.

2. Observations on the interpretation of the films have been given. With films of good quality, it is considered that lesions will not be missed, but that critical examination of these lesions must be made on 17 by 14 inch films. Attention is also drawn to the fact that a percentage of men will develop chest lesions despite negative findings on their enlistment.

3. A critical review of 40,000 miniature films has been given; 0·91% of these provided evidence of the reinfection type of tuberculosis. A list of other abnormalities found has been noted.

4. Attention has been directed to the pension aspect of tuberculosis in the last war. This has been the main motive behind the introduction of routine radiography of the chest for the second Australian Imperial Force. A plea is made for the continued recognition of the pathological basis of abnormal radiological shadows, and the question of standards of the chest investigation board has been discussed.

Acknowledgements.

I wish to thank Colonel A. M. McIntosh, Deputy Director of Medical Services, Eastern Command, for permission to publish this paper. My thanks are also due to Lieutenant-Colonel C. L. S. Macintosh, Lieutenant-Colonel Cotter Harvey, Dr. W. L. Calov and Dr. Maida Hall.

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MASS RADIOGRAPHY OF THE CHEST.[1]

By B. P. ANDERSON STUART, M.B., Ch.M., F.R.A.C.P.,
Sydney.

IF we are to reduce tuberculosis in the community to a minimum, it is of the utmost importance to discover as early as possible all patients who have or have had pulmonary tuberculosis in any form. On early diagnosis depends the whole success of our treatment and the effectiveness of our control of this disease. The subjects with minimal lesions will not be found among people who present themselves for medical examination because they feel ill; patients discovered in this manner will more often have well-established lesions. To find the patient with early tuberculosis we must examine the people who are apparently quite healthy. One of the most striking features of the mass surveys which have been carried out is the great number of people with pulmonary tuberculosis in all stages, from early to advanced, who are themselves quite unaware of any trouble.

It is now generally accepted that an X-ray examination of the chest is an essential item in a clinical examination for general health purposes. For many years efforts have been made in various countries to perfect a method whereby a small photograph could be taken of the image on a fluorescent screen and then viewed by projection. Innumerable technical difficulties, radiological, optical and photographic, have been overcome, and it is now possible to obtain a 35-millimetre photograph of a fluorescent screen image with such minute detail that it can be enlarged again with surprisingly little loss of its diagnostic quality. The cost of this examination is only a fraction of the cost of X-ray examination with the usual large film, and it is infinitely quicker.

Mass radiography of the chest was given a sudden and welcome impetus in Australia when the defence authorities required an X-ray examination of the chest of all recruits. These examinations have been made by fluorography on the 35-millimetre film, and they have been on a scale never before attempted in any other country, except Germany, where recruits are also radiologically examined. I am quite sure that the results of these military examinations, which Dr. White has analysed tonight, will show that the procedure was fully justified and will influence other countries to have the chests of all recruits radiologically examined before accepting them for service.

In carrying out a group examination we have four methods at our disposal: (i) direct radiography of the chest on a large film, (ii) fluoroscopy, (iii) fluorography by means of five by four inch X-ray films, and (iv) fluorography by means of 35-millimetre roll films. I shall briefly discuss each of these before giving a rather more detailed description of the 35-millimetre film method—the only one really suitable for large surveys.

Direct Radiography.

If a large group of subjects is to be examined, the ordinary method of obtaining a seventeen by fourteen inch X-ray film of each chest is impracticable. Each film has to be contained in a casette and developed, fixed, washed and dried separately. A very large staff would be necessary and the dark room facilities would have to be on an enormous scale. The whole process would be cumbersome and most expensive. The expense can be reduced by the use of sensitized paper instead of film; but the other difficulties remain.

[1] Read at a meeting of the New South Wales Branch of the British Medical Association on May 29, 1941.

Fluoroscopy.

It has been suggested that large numbers of patients could be fluoroscopically examined by a radiologist sitting behind a well-protected screen. This method is quite out of the question. In spite of any claims to the contrary, a really early tuberculous focus cannot even be seen on a fluorescent screen. In addition there would be considerable risk to the radiologist, however much protection was provided, and there would be no permanent record of the examination and no chance of making comparisons later if these were found necessary.

Fluorography by the Five by Four Inch Film Method.

A method of fluorography with five by four inch X-ray film has been developed by Hollis E. Potter, of Chicago, in association with the General Electric Corporation of America. The image on the fluorescent screen is photographed by means of a very large special lens onto an ordinary five by four inch double-coated X-ray film. This lens has a rating of f.1·5 and produces a sharply focused image over an area on the film 3·7 inches in diameter. A light-proof tunnel is used, similar to that used for the 35-millimetre method; the fluorescent screen is mounted at one end and the lens and camera apparatus are mounted at the other end. The screen-film distance used is 50 inches and the distance from the X-ray tube to the fluorescent screen is 44 inches.

A special fluorescent screen with a blue fluorescence of high actinic value and a long lag was developed by the Patterson Screen Company. Owing to the fact that the double-coated X-ray film is only semi-translucent, full light falls on the screen side of the film and about 60% affects the opposite side of the film. The results are very good; but I have found the films just a little too small to interpret with comfort, since they must be viewed directly on an ordinary viewing box.

The five by four inch film method is very suitable for large institutions where numerous examinations and follow-up examinations of chests are made. It has the advantage that a series of films showing the progress of a patient's lesion can be readily compared. The five by four inch film is naturally much cheaper than the seventeen by fourteen inch film; but the initial cost of the apparatus is high and would not be justified unless large numbers of examinations were to be made. The cost of the special lens alone is somewhere in the neighbourhood of £1,000.

This method is not suitable for mass survey examinations. The great disadvantage lies in the fact that these films have to be processed separately, or at any rate in small batches. The method was never intended for large surveys, but was developed in order to reduce the cost of numerous X-ray examinations in large clinics and sanatoria—a function which it satisfactorily fulfils.

Fluorography on 35-Millimetre Roll Film.

Fluorography on 35-millimetre roll film is the only method fulfilling all requirements for mass radiography. A light-proof tunnel is fitted with a fluorescent screen at one end and a miniature camera taking 35-millimetre roll films at the other. An f.1·5 aperture lens specially designed for miniature cameras is essential. The most suitable type of fluorescent screen is the fast zinc-sulphide type, such as the "Levy West" or "Heydon", which fluoresce with a bright apple-green light. Superspeed panchromatic film must be used. The Eastman Kodak Company recently made special films, one blue-sensitive for use with the Patterson "Special Fluorazure" screen, and the other green-sensitive for use with the "Levy West" or "Heydon" screen. The Eastman Kodak Company kindly sent me some of this film and I made some experiments with it. I found no improvement from using these special films, and my best results have been obtained with the "Kodak Super Panchromatic XX" film.

A focused microgrid is fitted on the X-ray tube side of the fluorescent screen to absorb scattered radiation. This greatly improves the contrast and definition of the films.

In an article which was published very recently in THE MEDICAL JOURNAL OF AUSTRALIA, Dr. Shellshear and I reported the results of the first 1,000 consecutive examinations made on behalf of the New South Wales Department of Public Health. In this article we described our apparatus and technique in considerable detail, and consequently I shall not refer to technical aspects in this paper except to stress what I consider to be four essentials, namely: a powerful four-valve rectified X-ray machine, an f.1·5 lens, a fast fluorescent screen, and a focused microgrid. Unfortunately the fluorographic examinations made by the military, which constitute practically the whole of the fluorographic work done in this country, have been made with unrectified X-ray machines that are not powerful enough for the purpose, and no microgrid has been used. This has resulted in considerable loss of diagnostic value. Actually it is not possible to use a microgrid without a powerful X-ray machine, since the use of the grid at least doubles the necessary exposure.

Apart altogether from the question of expense, the great advantage of the 35-millimetre film method lies in the speed of making the examination and the ease with which the films can be processed and viewed. Each roll of film will take 36 exposures; but cameras can be supplied which will accommodate rolls of 240 exposures. If necessary, a small length of film can at any time be pulled out and developed separately without damage to the rest of the roll. Developing, fixing and washing of these films together require about half an hour, and the films dry in a film drier in under half an hour. Thus the whole process can be completed in one hour.

The films are viewed by being projected onto a white matt surface or onto the back of a piece of flashed opal glass. This latter method gives the effect of looking through a film. A powerful projector is necessary and should be fitted with a photographic lens, preferably of long focal length. A pale blue glass fitted over the lens materially improves the image. If it is necessary to make frequent comparisons of films, two lanterns should be mounted side by side so that the films can be projected simultaneously.

It may be of interest if I briefly give the approximate costs of the various methods per 1,000 cases (Table I). This must, of course, be only a rough estimate, because so much will depend on the number of subjects to be examined and the speed with which the examinations are to be made. Obviously it will be relatively cheaper to examine 20,000 subjects than 1,000.

TABLE I.

Method.	Cost of Apparatus.	Assistants Required.	Cost of Material.
Ordinary radiography ..	£1,250	6 or more	£250
Fluorography with five by four inch film ..	£2,400	6	£30
Fluorography with thirty-five millimetre film ..	£1,250	4	£8

In any analysis of costs one must, of course, consider not only cost of materials used, but also the expenditure on salaries of a skilled staff, rent of premises and depreciation of apparatus. It must also be remembered that in most cases the X-ray machine would not be kept solely for fluorography.

In the mass examinations carried out on behalf of the Tuberculosis Division of the Department of Public Health patients of all ages were examined from infancy to old age. By far the greater number were young adults aged between fifteen and thirty years. Some of these were known to have tuberculosis, and some were known contacts; but most of them came of their own volition to satisfy themselves that they were not suffering from tuberculosis. This fact indicates the increasing health consciousness of the public, particularly in regard to this disease. These patients were referred through the Department of Public Health, or in some cases directly from private practitioners. Any subject referred through the Department of Public Health who showed a pathological lesion was referred back to the medical officer in charge of the Tuberculosis Division, who arranges for their treatment, whenever possible by their private practitioner. These examinations are carried out between the hours of 5 and 7 p.m., and the patients are charged 10s. 6d. There is a staff of five in all, and we find that with patients of both sexes, including a few fractious children, not more than about 60 to 70 can be examined per hour. It is the women and children that take up the time. In military work it is quite easy to make 200 to 270 examinations per hour.

The success of the Department of Public Health's scheme has been due to the fact that the examinations are made after working hours, the cost is low, and no patient has to wait for more than a few minutes. Whole families of contacts have been radiologically examined when in ordinary circumstances they could not have afforded the expense of a private examination and could not have got the time off to have the examination made at a public hospital during working hours. Again, many patients object to attending at a public hospital with the crowds of sick people and the inevitable long wait.

Of the first 1,000 subjects whom we examined, 47 (4·7%) were found to have active tuberculosis. Sixteen of these lesions were early, 19 were moderately advanced and 12 were advanced. Thirty-three subjects (3·3%) had tuberculous lesions which were apparently healed. In forty-two instances (4·2%) we found other lesions, such as pleural thickening, cardiac enlargement, aneurysm, bronchiectasis and pneumonokoniosis.

Owing to the large number of known contacts, the number of "positive" cases which we found in our series was abnormally high. On the other hand, owing to the high standard of health of volunteers for the army, the military figures are particularly low. The true incidence of pulmonary tuberculosis in the community lies somewhere between the two sets of figures and is probably in the vicinity of 1%.

The figures with regard to the incidence of pulmonary tuberculosis vary greatly in different countries, and even in different States of Australia. This is due almost entirely to a lack of uniformity in the interpretation of the films. We find a recruit, for instance, rejected in one State because of positive X-ray findings and accepted in another State with negative X-ray findings. Again, a recruit may be rejected from one arm of the services and accepted for another. If we reject a man for active service because of pulmonary tuberculosis, or indeed if we tell a patient in civil life that he has even a minor tuberculous lesion, we accept a very grave responsibility. We must never forget that the word "tuberculosis" is one of awful portent to the lay mind and conjures up visions of a long lingering illness culminating in death. I feel that radiologists are sometimes rather quick to suggest a tuberculous origin for a lesion with no definite grounds for doing so.

Since the advent of mass radiography of the chest, particularly in the examination of recruits, the significance of minor shadows in the chest has become increasingly important. We find that we have to decide whether a lesion is tuberculous, and if we regard it as such it is our duty to assess as far as possible its extent and degree of activity. With the exception of a small healed primary complex we can never be sure that a tuberculous lesion is completely healed; but we can frequently recognize well-known signs of activity, such as cavitation *et cetera*. Cavities should be carefully looked for and always reported when present. When I speak of minor shadows I have in mind particularly those faint shadows over the apices of the lungs which are so commonly referred to as "tuberculous scarring" at the apices. We all recognize that the extreme apices of the lungs are very common sites for early tuberculous lesions and that when these are present some thickening of the apical pleura occurs. However, we have no business to regard the mere presence of a cap of pleural thickening over the apex of a lung as being of tuberculous origin. There must be some consolidation or fibrosis of the parenchyma of the lung to warrant such a diagnosis. With increasing age the lungs lose some of

their elasticity and the apices shrink very slightly. The thoracic inlet becomes rigid, and as the apex of the lung shrinks it is pulled slightly down from the apex of the thoracic cavity; this results in a little retraction and thickening of the apical dome of the pleura. This dome is attached firmly by the first rib and to the spine, by the pleuro-costal and pleuro-vertebral ligaments, and is also supported by tendinous fibres from the scalenus muscles and by suspensory bands from the deep cervical fascia. These ligaments become stretched and the whole appearance is one of a cap of thickened pleura with a crenated margin, owing to the pull of its attachments. Of course, when a tuberculous lesion involves the apex this further reduces the volume of the lungs and the retraction of the apical pleura almost always occurs; but the point which I wish particularly to stress is that the condition is frequently non-tuberculous and should always be regarded as such in the absence of a parenchymal lesion.

A general loss of transradiancy of the apex of the lung is not necessarily due to consolidation or pleural thickening. The lung apices are overlain by numerous structures, such as the sterno-mastoid muscles, subclavian arteries, innominate veins, superior intercostal arteries and the inferior cervical ganglion of the sympathetic. These structures may vary slightly in size, position and density in different subjects. Moreover, slight differences in the placing of the patient may throw the faint shadows of some of these structures more over the apex of the lung than usual. Slight scoliosis of the upper dorsal region of the spine—a very common condition—will crowd the lung apex and the adjacent soft tissues on the concave side, causing a general loss of transradiancy.

We all make mistakes, and sometimes lesions which we regarded as healed subsequently turn out to be active. However, my plea for caution is not so much in the assessing of the extent and activity of a frankly tuberculous lesion as in suggesting that a lesion is tuberculous simply because it is located in the extreme apex. We all realize that recurrent attacks of pleurisy and pleural effusions are usually of tuberculous origin; but the fact that we see on an X-ray film some thickening of the pleura in a costo-phrenic angle certainly does not warrant our suggesting a tuberculous origin. In by far the greater number of cases the condition represents residual pleural thickening following some old non-tuberculous infection and is of little significance. In fact, in the examination of recruits we do not report thickening of pleura in the costo-phrenic angle unless it is pronounced.

Perhaps the greatest differences of opinion occur in the presence of calcified areas in the lung. There may be one or several small round calcified areas in the parenchyma of the lung—Ghon's foci. These represent a healed primary tuberculous complex, and I believe that in most cases they should not be even mentioned. Large areas of calcification representing healed tuberculous lesions of an adult type have a far more important significance, since there is always the possibility that they are not completely healed and may break down at a subsequent date. We regard them with great suspicion in civilian life and very rightly reject these patients from military service.

The normal markings in the lungs are due mostly to blood vessels. In conditions causing hyperæmia of the lungs these markings become exaggerated. The mere fact that these markings are unusually obvious does not warrant a "snap diagnosis" of chronic bronchitis, unless there is other evidence of such a condition. "Peribronchial fibrosis" is a term which I dislike, since I think that in the greater number of cases it is incorrect.

These somewhat critical remarks apply only to the early or minor changes that occur in the lungs, not to the gross lesions about which there is seldom any argument. I think it was Sir Oliver Lodge who said: "True scientists never differ in their observations, but only in the conclusions they draw therefrom." We all can see the same shadows, but we do not all agree as to the causation of the shadow, and if we do agree as to its origin, we frequently use different terms to describe it. If the physicians, radiologists and pathologists could discuss these shadows, I am sure that at least some of the confusion could be overcome and a more uniform interpretation and terminology might result.

Conclusion.

I have tried to convey to you that fluorography is an entirely satisfactory method for mass radiography of groups of unlimited size. Ultimately this will be our chief weapon in the campaign against tuberculosis. It is undoubtedly the greatest single contribution radiology has ever made towards improving and safeguarding the health of the nation. I look forward to the day when large firms, institutions and schools will cooperate with the health authorities and by means of mass survey will weed out all subjects of pulmonary tuberculosis.

However, perhaps it is timely to emphasize that it is no use discovering persons with tuberculosis unless at the same time adequate provision is made for their treatment. Clinics should be numerous and widespread, and they should be fully equipped for diagnosis and treatment. There must also be adequate hospital and sanatorium accommodation for patients requiring special treatment. If this is not available, its lack will constitute a bottleneck and will wreck any scheme for the eradication of tuberculosis.

Acknowledgement.

In conclusion I should like to say that all the work I have done in photofluorography has been carried out in association with Dr. Shellshear, and without his close collaboration these results would not have been possible.

THE CHANGING SCENE IN MEDICINE: VAN DIEMEN'S LAND, 1803 TO 1853.[1]

By W. E. L. H. CROWTHER,
Hobart.

Excellent courage our fathers bore,
Excellent heart had our fathers of old.
None too learned, but nobly bold
Into the fight went our fathers of old.

RUDYARD KIPLING.

MY address tonight is a survey, necessarily incomplete, of the development and administration of our profession in Van Diemen's Land. The period is from the settlement of 1803 to the cessation of transportation and the granting of responsible government fifty years later. The settlement of the island took place at Risdon, Sullivan's Cove and Port Dalrymple. Each of the expeditions consisted of a small group of officials, the military, a few free individuals and a main body of convicts. The last mentioned were to develop and provide for the colony, except for such supplies as might be spared from Sydney Cove.

The settlements were administered by Lieutenant Bowen, Colonel Paterson and Colonel Collins as penal establishments, and on the death of Collins the system was continued by Colonel Davey. During his régime and that of Colonel Sorell, emancipated convicts acquired land and civil status and in many instances sent home for their relatives and friends. In the early part of the third decade of the nineteenth century there was a steady influx of free settlers, and although morals were lax, life was relatively easy. There was considerable prosperity from the growing of wheat and the sale of whale oil and seal skins.

With the arrival of Colonel Arthur in 1824, far-reaching changes took place. For Sorell's policy of developing the island by free settlers Arthur substituted his own rigid penal system. In making the island primarily a penal settlement, he consistently denied to free individuals and to the Press any rights that in his opinion hampered this policy. Incoming convicts were assigned as servants to government departments and approved free individuals, and might by good conduct eventually obtain a ticket of

[1] An address delivered at the third annual meeting of the Tasmanian Fellows and Members of the Royal Australasian College of Physicians, on March 14, 1941.

labelled who have subsequently been proved to be non-tuberculous. As an example I instance the case of I.R.

This patient, a young woman, complained of tiredness and a cough, of ten days' duration. She remained at work, but sought medical advice because her symptoms persisted. A skiagram of her chest showed increased markings in the right upper zone, which appeared to be "typical" of a fibro-exudative type of tuberculosis. There was no response, however, to the Mantoux test. This was repeated three times, and the same result was obtained on each occasion. A further skiagram taken six weeks later revealed no abnormal shadows. Undoubtedly this was a case of "ambulatory pneumonia".

At one of the tuberculosis clinics in Sydney a recent review of 110 consecutive cases revealed that in 10 of these a radiological diagnosis of tuberculosis was made and subsequently shown to be incorrect. This is matter for serious thought and consideration.

Again, the question of activity of radiological lesions is another vexed question, and one about which controversy has raged for many years. This has been a source of much interest to members of the chest board. Dr. Reginald Webster's recent communication to the Royal Australasian College of Physicians I am sure has been a revelation to many.[1] In his work Dr. Webster has cultured tubercle bacilli from material taken from a large number of patients with so-called inactive pulmonary tuberculosis. The work is continuing, and the full results are yet to be published; but they already confirm in a striking manner the fact that it is impossible to state from the appearance of an X-ray film that a tuberculous lesion is healed. I hope that it will have been noticed that in my classification of "active" and "inactive" lesions previously given, these are qualified by the word "possibly".

Intimately bound up with the interpretation of the films has been the final "boarding" of men suspected of chest disease. Decisions as to fitness or otherwise for army service have indeed been made with the greatest difficulty in many cases. This brings up the all-important question of standards—whether any recruit showing evidence of past tuberculosis should be accepted for service or not. At the outset it has been agreed by all that those showing "healed" primary tuberculous infection, such as the typical Ghon's focus, may be passed without question. But concerning those showing any evidence of the reinfection type of disease or "adult" type, or secondary, or tertiary infection—whichever classification is adopted—there is scope for much argument. As a general rule, for military purposes I am strongly of the opinion that all such men should be rejected, and this view has been shared by other members of the chest board. This applies to all men, even if the lesion appears to be "healed". For practical purposes in civil practice I have usually regarded lesions showing calcification as the true criterion of arrest; but it is recalled that Wingfield once remarked that no patient may be said to be cured of tuberculosis until he is safely dead of another disease. Also Aronson and Opie[(10)] and others have grown tubercle bacilli from calcified nodules. However, I think the risk that tubercle bacilli may escape from the centre of a calcified nodule is not very great. The question of standards has exercised the minds of all those sitting on chest boards, both in this State and in other States of the Commonwealth. Last year I suggested certain standards for the chest board in Sydney, and for a short period these were adopted. Briefly they were as follows. No recruits showing evidence of the reinfection type of tuberculosis, active or inactive, should be accepted for overseas service. When there was no clinical or pathological evidence of activity, the following might be accepted for home service, subject to repeated X-ray examination: (i) those in whose skiagrams appeared an area of calcification no greater than three-eights of an inch in diameter (approximately), or three similar calcified nodules aggregating this amount; (ii) those in whose skiagrams appeared an area of fibrosis, equivalent to an area one inch in diameter. This latitude was intended only for those required either for special duties or for clerical work, and provided the subject was aged over forty years. The reasons activating this decision were the following: (*a*) Subjects aged over forty years would be less likely to suffer recrudescence. (*b*) The type of work would not necessarily be strenuous and the risk of breakdown would consequently be less. (*c*) The possibility of reactivation with these minimal lesions would not be very great. In the case of a subject with multiple calcified foci in a lung field, the chances of recrudescence would be more than in that of one with two or three small foci.

From a military point of view, however, the adoption of this standard is not desirable. After all, the work of the army must continue without increased medical burdens, and every such recruit retained means frequent observation and "boarding". It is, however, my considered opinion that there are some men affected by what might be reasonably considered inactive lesions who are required for key positions, and who should be retained in the army despite the possibility of aggravation of their tuberculous lesion. But, of course, this is a question to be decided by higher military authorities and not by a medical board.

[1] See leading article, THE MEDICAL JOURNAL OF AUSTRALIA, May 10, 1941.

Summary and Conclusion.

1. A description of the routine examination by the miniature fluorophotographic method of applicants for the Australian Imperial Force has been recorded.

2. Observations on the interpretation of the films have been given. With films of good quality, it is considered that lesions will not be missed, but that critical examination of these lesions must be made on 17 by 14 inch films. Attention is also drawn to the fact that a percentage of men will develop chest lesions despite negative findings on their enlistment.

3. A critical review of 40,000 miniature films has been given; 0·91% of these provided evidence of the reinfection type of tuberculosis. A list of other abnormalities found has been noted.

4. Attention has been directed to the pension aspect of tuberculosis in the last war. This has been the main motive behind the introduction of routine radiography of the chest for the second Australian Imperial Force. A plea is made for the continued recognition of the pathological basis of abnormal radiological shadows, and the question of standards of the chest investigation board has been discussed.

Acknowledgements.

I wish to thank Colonel A. M. McIntosh, Deputy Director of Medical Services, Eastern Command, for permission to publish this paper. My thanks are also due to Lieutenant-Colonel C. L. S. Macintosh, Lieutenant-Colonel Cotter Harvey, Dr. W. L. Calov and Dr. Maida Hall.

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MASS RADIOGRAPHY OF THE CHEST.[1]

By B. P. ANDERSON STUART, M.B., Ch.M., F.R.A.C.P.,
Sydney.

IF we are to reduce tuberculosis in the community to a minimum, it is of the utmost importance to discover as early as possible all patients who have or have had pulmonary tuberculosis in any form. On early diagnosis depends the whole success of our treatment and the effectiveness of our control of this disease. The subjects with minimal lesions will not be found among people who present themselves for medical examination because they feel ill; patients discovered in this manner will more often have well-established lesions. To find the patient with early tuberculosis we must examine the people who are apparently quite healthy. One of the most striking features of the mass surveys which have been carried out is the great number of people with pulmonary tuberculosis in all stages, from early to advanced, who are themselves quite unaware of any trouble.

It is now generally accepted that an X-ray examination of the chest is an essential item in a clinical examination for general health purposes. For many years efforts have been made in various countries to perfect a method whereby a small photograph could be taken of the image on a fluorescent screen and then viewed by projection. Innumerable technical difficulties, radiological, optical and photographic, have been overcome, and it is now possible to obtain a 35-millimetre photograph of a fluorescent screen image with such minute detail that it can be enlarged again with surprisingly little loss of its diagnostic quality. The cost of this examination is only a fraction of the cost of X-ray examination with the usual large film, and it is infinitely quicker.

Mass radiography of the chest was given a sudden and welcome impetus in Australia when the defence authorities required an X-ray examination of the chest of all recruits. These examinations have been made by fluorography on the 35-millimetre film, and they have been on a scale never before attempted in any other country, except Germany, where recruits are also radiologically examined. I am quite sure that the results of these military examinations, which Dr. White has analysed tonight, will show that the procedure was fully justified and will influence other countries to have the chests of all recruits radiologically examined before accepting them for service.

In carrying out a group examination we have four methods at our disposal: (i) direct radiography of the chest on a large film, (ii) fluoroscopy, (iii) fluorography by means of five by four inch X-ray films, and (iv) fluorography by means of 35-millimetre roll films. I shall briefly discuss each of these before giving a rather more detailed description of the 35-millimetre film method—the only one really suitable for large surveys.

Direct Radiography.

If a large group of subjects is to be examined, the ordinary method of obtaining a seventeen by fourteen inch X-ray film of each chest is impracticable. Each film has to be contained in a casette and developed, fixed, washed and dried separately. A very large staff would be necessary and the dark room facilities would have to be on an enormous scale. The whole process would be cumbersome and most expensive. The expense can be reduced by the use of sensitized paper instead of film; but the other difficulties remain.

[1] Read at a meeting of the New South Wales Branch of the British Medical Association on May 29, 1941.

Fluoroscopy.

It has been suggested that large numbers of patients could be fluoroscopically examined by a radiologist sitting behind a well-protected screen. This method is quite out of the question. In spite of any claims to the contrary, a really early tuberculous focus cannot even be seen on a fluorescent screen. In addition there would be considerable risk to the radiologist, however much protection was provided, and there would be no permanent record of the examination and no chance of making comparisons later if these were found necessary.

Fluorography by the Five by Four Inch Film Method.

A method of fluorography with five by four inch X-ray film has been developed by Hollis E. Potter, of Chicago, in association with the General Electric Corporation of America. The image on the fluorescent screen is photographed by means of a very large special lens onto an ordinary five by four inch double-coated X-ray film. This lens has a rating of f.1·5 and produces a sharply focused image over an area on the film 3·7 inches in diameter. A light-proof tunnel is used, similar to that used for the 35-millimetre method; the fluorescent screen is mounted at one end and the lens and camera apparatus are mounted at the other end. The screen-film distance used is 50 inches and the distance from the X-ray tube to the fluorescent screen is 44 inches.

A special fluorescent screen with a blue fluorescence of high actinic value and a long lag was developed by the Patterson Screen Company. Owing to the fact that the double-coated X-ray film is only semi-translucent, full light falls on the screen side of the film and about 60% affects the opposite side of the film. The results are very good; but I have found the films just a little too small to interpret with comfort, since they must be viewed directly on an ordinary viewing box.

The five by four inch film method is very suitable for large institutions where numerous examinations and follow-up examinations of chests are made. It has the advantage that a series of films showing the progress of a patient's lesion can be readily compared. The five by four inch film is naturally much cheaper than the seventeen by fourteen inch film; but the initial cost of the apparatus is high and would not be justified unless large numbers of examinations were to be made. The cost of the special lens alone is somewhere in the neighbourhood of £1,000.

This method is not suitable for mass survey examinations. The great disadvantage lies in the fact that these films have to be processed separately, or at any rate in small batches. The method was never intended for large surveys, but was developed in order to reduce the cost of numerous X-ray examinations in large clinics and sanatoria—a function which it satisfactorily fulfils.

Fluorography on 35-Millimetre Roll Film.

Fluorography on 35-millimetre roll film is the only method fulfilling all requirements for mass radiography. A light-proof tunnel is fitted with a fluorescent screen at one end and a miniature camera taking 35-millimetre roll films at the other. An f.1·5 aperture lens specially designed for miniature cameras is essential. The most suitable type of fluorescent screen is the fast zinc-sulphide type, such as the "Levy West" or "Heydon", which fluoresce with a bright apple-green light. Superspeed panchromatic film must be used. The Eastman Kodak Company recently made special films, one blue-sensitive for use with the Patterson "Special Fluorazure" screen, and the other green-sensitive for use with the "Levy West" or "Heydon" screen. The Eastman Kodak Company kindly sent me some of this film and I made some experiments with it. I found no improvement from using these special films, and my best results have been obtained with the "Kodak Super Panchromatic XX" film.

A focused microgrid is fitted on the X-ray tube side of the fluorescent screen to absorb scattered radiation. This greatly improves the contrast and definition of the films.

In an article which was published very recently in THE MEDICAL JOURNAL OF AUSTRALIA, Dr. Shellshear and I reported the results of the first 1,000 consecutive examinations made on behalf of the New South Wales Department of Public Health. In this article we described our apparatus and technique in considerable detail, and consequently I shall not refer to technical aspects in this paper except to stress what I consider to be four essentials, namely: a powerful four-valve rectified X-ray machine, an f.1·5 lens, a fast fluorescent screen, and a focused microgrid. Unfortunately the fluorographic examinations made by the military, which constitute practically the whole of the fluorographic work done in this country, have been made with unrectified X-ray machines that are not powerful enough for the purpose, and no microgrid has been used. This has resulted in considerable loss of diagnostic value. Actually it is not possible to use a microgrid without a powerful X-ray machine, since the use of the grid at least doubles the necessary exposure.

Apart altogether from the question of expense, the great advantage of the 35-millimetre film method lies in the speed of making the examination and the ease with which the films can be processed and viewed. Each roll of film will take 36 exposures; but cameras can be supplied which will accommodate rolls of 240 exposures. If necessary, a small length of film can at any time be pulled out and developed separately without damage to the rest of the roll. Developing, fixing and washing of these films together require about half an hour, and the films dry in a film drier in under half an hour. Thus the whole process can be completed in one hour.

The films are viewed by being projected onto a white matt surface or onto the back of a piece of flashed opal glass. This latter method gives the effect of looking through a film. A powerful projector is necessary and should be fitted with a photographic lens, preferably of long focal length. A pale blue glass fitted over the lens materially improves the image. If it is necessary to make frequent comparisons of films, two lanterns should be mounted side by side so that the films can be projected simultaneously.

It may be of interest if I briefly give the approximate costs of the various methods per 1,000 cases (Table I). This must, of course, be only a rough estimate, because so much will depend on the number of subjects to be examined and the speed with which the examinations are to be made. Obviously it will be relatively cheaper to examine 20,000 subjects than 1,000.

TABLE I.

Method.	Cost of Apparatus.	Assistants Required.	Cost of Material.
Ordinary radiography ..	£1,250	6 or more	£250
Fluorography with five by four inch film ..	£2,400	6	£30
Fluorography with thirty-five millimetre film ..	£1,250	4	£8

In any analysis of costs one must, of course, consider not only cost of materials used, but also the expenditure on salaries of a skilled staff, rent of premises and depreciation of apparatus. It must also be remembered that in most cases the X-ray machine would not be kept solely for fluorography.

In the mass examinations carried out on behalf of the Tuberculosis Division of the Department of Public Health patients of all ages were examined from infancy to old age. By far the greater number were young adults aged between fifteen and thirty years. Some of these were known to have tuberculosis, and some were known contacts; but most of them came of their own volition to satisfy themselves that they were not suffering from tuberculosis. This fact indicates the increasing health consciousness of the public, particularly in regard to this disease. These patients were referred through the Department of Public Health, or in some cases directly from private practitioners. Any subject referred through the Department of Public Health who showed a pathological lesion was referred back to the medical officer in charge of the Tuberculosis Division, who arranges for their treatment, whenever possible by their private practitioner. These examinations are carried out between the hours of 5 and 7 p.m., and the patients are charged 10s. 6d. There is a staff of five in all, and we find that with patients of both sexes, including a few fractious children, not more than about 60 to 70 can be examined per hour. It is the women and children that take up the time. In military work it is quite easy to make 200 to 250 examinations per hour.

The success of the Department of Public Health's scheme has been due to the fact that the examinations are made after working hours, the cost is low, and no patient has to wait for more than a few minutes. Whole families of contacts have been radiologically examined when in ordinary circumstances they could not have afforded the expense of a private examination and could not have got the time off to have the examination made at a public hospital during working hours. Again, many patients object to attending at a public hospital with the crowds of sick people and the inevitable long wait.

Of the first 1,000 subjects whom we examined, 47 (4·7%) were found to have active tuberculosis. Sixteen of these lesions were early, 19 were moderately advanced and 12 were advanced. Thirty-three subjects (3·3%) had tuberculous lesions which were apparently healed. In forty-two instances (4·2%) we found other lesions, such as pleural thickening, cardiac enlargement, aneurysm, bronchiectasis and pneumonokoniosis.

Owing to the large number of known contacts, the number of "positive" cases which we found in our series was abnormally high. On the other hand, owing to the high standard of health of volunteers for the army, the military figures are particularly low. The true incidence of pulmonary tuberculosis in the community lies somewhere between the two sets of figures and is probably in the vicinity of 1%.

The figures with regard to the incidence of pulmonary tuberculosis vary greatly in different countries, and even in different States of Australia. This is due almost entirely to a lack of uniformity in the interpretation of the films. We find a recruit, for instance, rejected in one State because of positive X-ray findings and accepted in another State with negative X-ray findings. Again, a recruit may be rejected from one arm of the services and accepted for another. If we reject a man for active service because of pulmonary tuberculosis, or indeed if we tell a patient in civil life that he has even a minor tuberculous lesion, we accept a very grave responsibility. We must never forget that the word "tuberculosis" is one of awful portent to the lay mind and conjures up visions of a long lingering illness culminating in death. I feel that radiologists are sometimes rather quick to suggest a tuberculous origin for a lesion with no definite grounds for doing so.

Since the advent of mass radiography of the chest, particularly in the examination of recruits, the significance of minor shadows in the chest has become increasingly important. We find that we have to decide whether a lesion is tuberculous, and if we regard it as such it is our duty to assess as far as possible its extent and degree of activity. With the exception of a small healed primary complex we can never be sure that a tuberculous lesion is completely healed; but we can frequently recognize well-known signs of activity, such as cavitation *et cetera*. Cavities should be carefully looked for and always reported when present. When I speak of minor shadows I have in mind particularly those faint shadows over the apices of the lungs which are so commonly referred to as "tuberculous scarring" at the apices. We all recognize that the extreme apices of the lungs are very common sites for early tuberculous lesions and that when these are present some thickening of the apical pleura occurs. However, we have no business to regard the mere presence of a cap of pleural thickening over the apex of a lung as being of tuberculous origin. There must be some consolidation or fibrosis of the parenchyma of the lung to warrant such a diagnosis. With increasing age the lungs lose some of

their elasticity and the apices shrink very slightly. The thoracic inlet becomes rigid, and as the apex of the lung shrinks it is pulled slightly down from the apex of the thoracic cavity; this results in a little retraction and thickening of the apical dome of the pleura. This dome is attached firmly to the first rib and to the spine, by the pleuro-costal and pleuro-vertebral ligaments, and is also supported by tendinous fibres from the scalenus muscles and by suspensory bands from the deep cervical fascia. These ligaments become stretched and the whole appearance is one of a cap of thickened pleura with a crenated margin, owing to the pull of its attachments. Of course, when a tuberculous lesion involves the apex this further reduces the volume of the lungs and the retraction of the apical pleura almost always occurs; but the point which I wish particularly to stress is that the condition is frequently non-tuberculous and should always be regarded as such in the absence of a parenchymal lesion.

A general loss of transradiancy of the apex of the lung is not necessarily due to consolidation or pleural thickening. The lung apices are overlain by numerous structures, such as the sterno-mastoid muscles, subclavian arteries, innominate veins, superior intercostal arteries and the inferior cervical ganglion of the sympathetic. These structures may vary slightly in size, position and density in different subjects. Moreover, slight differences in the placing of the patient may throw the faint shadows of some of these structures more over the apex of the lung than usual. Slight scoliosis of the upper dorsal region of the spine—a very common condition—will crowd the lung apex and the adjacent soft tissues on the concave side, causing a general loss of transradiancy.

We all make mistakes, and sometimes lesions which we regarded as healed subsequently turn out to be active. However, my plea for caution is not so much in the assessing of the extent and activity of a frankly tuberculous lesion as in suggesting that a lesion is tuberculous simply because it is located in the extreme apex. We all realize that recurrent attacks of pleurisy and pleural effusions are usually of tuberculous origin; but the fact that we see on an X-ray film some thickening of the pleura in a costo-phrenic angle certainly does not warrant our suggesting a tuberculous origin. In by far the greater number of cases the condition represents residual pleural thickening following some old non-tuberculous infection and is of little significance. In fact, in the examination of recruits we do not report thickening of pleura in the costo-phrenic angle unless it is pronounced.

Perhaps the greatest differences of opinion occur in the presence of calcified areas in the lung. There may be one or several small round calcified areas in the parenchyma of the lung—Ghon's foci. These represent a healed primary tuberculous complex, and I believe that in most cases they should not be even mentioned. Large areas of calcification representing healed tuberculous lesions of an adult type have a far more important significance, since there is always the possibility that they are not completely healed and may break down at a subsequent date. We regard them with great suspicion in civilian life and very rightly reject these patients from military service.

The normal markings in the lungs are due mostly to blood vessels. In conditions causing hyperæmia of the lungs these markings become exaggerated. The mere fact that these markings are unusually obvious does not warrant a "snap diagnosis" of chronic bronchitis, unless there is other evidence of such a condition. "Peribronchial fibrosis" is a term which I dislike, since I think that in the greater number of cases it is incorrect.

These somewhat critical remarks apply only to the early or minor changes that occur in the lungs, not to the gross lesions about which there is seldom any argument. I think it was Sir Oliver Lodge who said: "True scientists never differ in their observations, but only in the conclusions they draw therefrom." We all can see the same shadows, but we do not all agree as to the causation of the shadow, and if we do agree as to its origin, we frequently use different terms to describe it. If the physicians, radiologists and pathologists could discuss these shadows, I am sure that at least some of the confusion could be overcome and a more uniform interpretation and terminology might result.

Conclusion.

I have tried to convey to you that fluorography is an entirely satisfactory method for mass radiography of groups of unlimited size. Ultimately this will be our chief weapon in the campaign against tuberculosis. It is undoubtedly the greatest single contribution radiology has ever made towards improving and safeguarding the health of the nation. I look forward to the day when large firms, institutions and schools will cooperate with the health authorities and by means of mass survey will weed out all subjects of pulmonary tuberculosis.

However, perhaps it is timely to emphasize that it is no use discovering persons with tuberculosis unless at the same time adequate provision is made for their treatment. Clinics should be numerous and widespread, and they should be fully equipped for diagnosis and treatment. There must also be adequate hospital and sanatorium accommodation for patients requiring special treatment. If this is not available, its lack will constitute a bottleneck and will wreck any scheme for the eradication of tuberculosis.

Acknowledgement.

In conclusion I should like to say that all the work I have done in photofluorography has been carried out in association with Dr. Shelishear, and without his close collaboration these results would not have been possible.

THE CHANGING SCENE IN MEDICINE: VAN DIEMEN'S LAND, 1803 TO 1853.[1]

By W. E. L. H. CROWTHER,
Hobart.

Excellent courage our fathers bore,
Excellent heart had our fathers of old.
None too learned, but nobly bold
Into the fight went our fathers of old.

RUDYARD KIPLING.

My address tonight is a survey, necessarily incomplete, of the development and administration of our profession in Van Diemen's Land. The period is from the settlement of 1803 to the cessation of transportation and the granting of responsible government fifty years later. The settlement of the island took place at Risdon, Sullivan's Cove and Port Dalrymple. Each of the expeditions consisted of a small group of officials, the military, a few free individuals and a main body of convicts. The last mentioned were to develop and provide for the colony, except for such supplies as might be spared from Sydney Cove.

The settlements were administered by Lieutenant Bowen, Colonel Paterson and Colonel Collins as penal establishments, and on the death of Collins the system was continued by Colonel Davey. During his régime and that of Colonel Sorell, emancipated convicts acquired land and civil status and in many instances sent home for their relatives and friends. In the early part of the third decade of the nineteenth century there was a steady influx of free settlers, and although morals were lax, life was relatively easy. There was considerable prosperity from the growing of wheat and the sale of whale oil and seal skins.

With the arrival of Colonel Arthur in 1824, far-reaching changes took place. For Sorell's policy of developing the island by free settlers Arthur substituted his own rigid penal system. In making the island primarily a penal settlement, he consistently denied to free individuals and to the Press any rights that in his opinion hampered this policy. Incoming convicts were assigned as servants to government departments and approved free individuals, and might by good conduct eventually obtain a ticket of

[1] An address delivered at the third annual meeting of the Tasmanian Fellows and Members of the Royal Australasian College of Physicians, on March 14, 1941.

leave and conditional or even free pardon. For those who did not reform there were the chain gangs, road parties and penal stations, of which Macquarie Harbour and Port Arthur were the most dreaded.

To staff such a system a large medical establishment was essential. During the successive governorships of Sir J. Franklin, Colonel Denison and Sir John Eardley-Wilmot, the severity of this system was relaxed and changes were introduced. The most noteworthy was the introduction of the probation system with scattered probation stations throughout the island, to each of which a surgeon was attached. With the cessation of transportation in May, 1853, came the gradual closing down of the penal stations and the decline of the day of the government medical officers. With their activities and with those of the non-official medical men and with the interaction of both on the general life of the community this address is concerned.

The Official Period (1803 to 1821).

At each settlement there were, of course, one or more colonial surgeons, commissioned officers, with a definite seniority, salary and allowances. Jacob Mountgarrett, commissioned on March 31, 1803, as surgeon or assistant surgeon "as His Majesty's pleasure may direct", served in this capacity with Lieutenant Bowen, and so was the forerunner of our profession. With Collins on February 15, 1804, arrived William I'Anson, surgeon, Matthew Bowden, first assistant surgeon, and William Hopley, second assistant surgeon. All were very young men and were fated to end their days in the colony. Bowden, who was aged only thirty-five years and twelve days when he died suddenly at his farm at New Town, was the longest lived of the three. Some account of their activities has been given in a former paper.[1] Theirs was a strange environment. The isolation of the settlement was enhanced by what seems to have been a systematic neglect of its affairs by the home government. We know that for years Collins waited in vain for answers to urgent dispatches, in which he had asked for directions in matters of policy. Thrown on their own resources, except for the occasional visits of whalers and other ships, the officials, as Knopwood's journals show, did attempt some social life among themselves. The long absence from their families led in more than one instance to irregular unions with convict women, and heavy drinking of rum (when available) seems to have been universal. These factors may explain in part the early demise of these three surgeons. Collins himself died suddenly in 1810, by which time, apart from Hobart Town, settlements had been formed at New Norfolk and Pittwater as well as in the North. Three years earlier the first overland journey of Lieutenant Laycock had opened land communication between the two ends of the island. At Hobart Town the first house of wattle and daub, with windows like the portholes of a ship, had been built in Macquarie Street adjacent to where Macquarie House still stands. The military barracks, a jail, Knopwood's cottage and makeshift buildings along Macquarie and Elizabeth Streets, with establishments (including "The Whaler's Arms") on the waterfront, then constituted the greater part of the little capital. The only record of its social life is to be found in the terse and revealing sentences of Knopwood's journal. The surgeons joined the lieutenant-governer and other officials in what little entertainment dining and wining at each other's homes afforded, and the arrival of ships brought the great boon of new supplies of food and drink, with fresh company and news from the outer world. Grants of land were made to all officials and free men, and records exist of the farming activities of Mountgarret and Bowden, both of whom had brought some livestock to the colony. Three months after Matthew Bowden's sudden death at his New Town farm in October, 1814, Mr. Edward Luttrell was appointed senior colonial surgeon. His duties included the medical care of bond and free, the administration and control of the hospital, requisitioning of medical supplies from England and Sydney as well as all matters concerning the health of the community.

During these years at the northern end of the island Mr. Mountgarret had been carrying on, and this is perhaps the place to describe more fully the chequered life of our first surgeon. He had joined the Royal Navy in 1798 and served in a ship's action with the Spanish frigate *Sabina* as well as with Jarvis in the battle of Cape St. Vincent. From His Majesty's Ship *Glatton* (carrying 400 male and 200 female prisoners) he was posted to Bowen's expedition, and landed at Risdon in September, 1803. It has been stated that the suggestion to fire the carronade in the tragic clash there with the aborigines came from him. To us, a consultation held with Bowden soon after Mountgarret's landing is of interest. It concerns Mr. John Hartley, a free settler, and evidently a malingerer, who the Governor felt was not "pulling his weight" as carpenter to the expedition. The consultants decided that their patient was in a state of debility "occasioned as we apprehended from persisting in keeping his bed". A nutritive diet and a little wine were ordered, and accordingly "twice a gallon of sherry and 8 to 10 pounds of rice and oatmeal were sent at different times"—supplies that could be ill-spared. Returning from Risdon to Sydney, Mountgarret was appointed to Colonel Paterson's expedition and was at the founding of Port Dalrymple. Here he took part in the exploration of the Tamar area, Mountgarret's Lagoon being named after him, and at a later period he discovered the Franklin River. He was for a time in Sydney, and there in 1815 his arm was amputated, as a consequence, to quote himself, "of the exercises of his duties as a surgeon". At the Tamar he was granted the rare privilege of ownership of a boat, locally built and of 13 tons' burden; he sent it sealing to Bass Strait. Although he was a magistrate of the settlement, this strange character was a source of considerable anxiety to the government. On four occasions at least he had to answer such charges as having been absent from his duties without leave, having given assistance to bushrangers and having stolen stock. At least one midland landowner of good family was hanged some years later by Colonel Arthur for this last offence, and Mountgarret can hardly have been surprised when his appointment as a justice of the peace was terminated by Colonel Macquarie. In the active medical work of his scattered district he was assisted by Mr. John Smith, surgeon, 102nd Regiment, and Mr. Owens. A later appointee to Georgetown was the surgeon R. R. Priest, who in 1826, during an encounter with bushrangers, was shot in the leg. He died as a result of these injuries after having refused to submit to an amputation. In the south of the island Edward Luttrell (1815) had, as I have said, taken over the Colonial Hospital. Few official records of the period of Colonel Davey remain, but Luttrell's name is remembered not from his professional work, which was handicapped by a social defect and by Macquarie's distrust and dislike, but as a result of his distinguished lineage. After his retirement from his position in 1821 he made his memorable claim to an Irish earldom and a rent roll of some £14,000 *per annum*. It is still believed in Hobart that the discovery of one missing document would establish the claim of his descendants to this title.

The Official and Non-Official Period (1821 to 1834).

James Scott, M.D., R.N., who succeeded Luttrell, was for many years the unquestioned head of medical affairs in the colony. His marriage with Lucy Davey greatly enhanced his social status as senior colonial surgeon. At the wedding Colonel Macquarie, who chanced to be in Hobart Town, made the bride the noble gift of a large area of land at New Town. There Scott built his home, "Boa Vista" (now Clemes College); it is still unspoiled, and the rooms are much as he must have left them. Years later Mrs. Caroline Leaky, whilst convalescing there from a long illness, wrote part at least of her volume of poems "*Lyra Australis*". This was followed five years later on her return to England by the book by which she will be long remembered in Tasmania, "The Broad Arrow", "being passages from the history of Maida Gwynham, a lifer". Dr. Lamb, the surgeon she portrays in this book, is known to have been Sir James Agnew, later to be mentioned in this address.

To return to Scott: he was for many years colonial surgeon, and in addition to control of the hospital and

administration of the medical service, had a large private practice.

By the end of 1824 the medical establishment was the following:

Surgeon at Hobart Town: James Scott, R.N.
Surgeon at Launceston: R. R. Priest, Esquire,
First Assistant Surgeon: R. W. Owen, at Georgetown.
Second Assistant Surgeon: Mr. Robert Garrett, at Hobart Town.
Third Assistant Surgeon: Mr. James Spencer, at Macquarie Harbour.
Fourth Assistant Surgeon: Mr. Henry Crockett, at Hobart Town.
Fifth Assistant Surgeon: Mr. W. Seccombe, at Pittwater.
Dispenser of Medicines: Mr. A. McLaughlin, at Hobart Town.
Clerk: Thomas Shackleton.
District Assistant Surgeons: Mr. Robert Officer, at New Norfolk; Mr. William Paton, at River Clyde; and Mr. John Hudspeth, at Jericho.

The strong hand of Colonel Arthur may be seen already in this regrouping of Colonel Sorell's less ambitious medical department. It was designed to forward his policy of the development of Van Diemen's Land as a penal colony, and as a consequence the medical staff will be seen to have been posted to areas where large penal establishments, road-making and other developments were in progress.

The Hospitals.

By 1819 His Majesty's Colonial Hospital had for eight years been functioning on the site selected by Colonel Macquarie. Its predecessors had been a tent or shelter about where the Town Hall now stands, a house of sorts used in 1806, and then a second house in Liverpool Street, rented from Thomas Peters for the sum of 30s. to 40s. per week. The two-story building of 1820-1821 was designed by Mr. G. W. Evans, Deputy Surveyor-General, and comprised four front wards measuring twenty-eight feet by fifteen feet, with two at the back, each eight feet less in length; 56 beds, six feet by two foot six inches in size, were arranged ten to each large ward and eight in the smaller. Iron bedsteads arrived from England in 1826. Six years earlier a post and rail fence had been put up around the building. Seager[3] described the hospital as of brick "stuccoed and the ranges of buildings at right angles to it were also built with brick with verandahs along each front. The style of these verandahs were similar to those so well known during the regime of the military, with circular wooden columns and brick floors." This design may still be seen at the barracks, and the commandant's house, today in full use, was the old military hospital and contemporary to the building just described. Elsewhere in the colony other hospitals were being built. Georgetown, between 1820 and 1830, had a fifteen-bed hospital which was in use until 1845. Launceston must have had one from its inception. New Norfolk, on June 22, 1827, welcomed its first batch of patients to a "temporary barracks for invalids". They are reported to have consisted entirely of invalid convicts and paupers from the Colonial Hospital and convict barracks. Ten years were to pass before a board of inquiry reported conditions to be bad and recommended certain additional buildings as absolutely necessary. Prior to this, however, quarters had been erected for the assistant surgeon, Dr. Robert Officer.

Such is an outline of the medical services during the years from 1820 to 1830; but as a steady flow of free settlers as well as large numbers of convicts were entering the colony, there were constant changes and additions to its personnel. Apart from those mentioned, between 1820 and 1843 some 27 medical officers were added to the establishment. They included: J. F. Sharland, 1829; G. F. Storey, 1829; F. G. Brock, 1835; William Dermer, 1839; C. G. Casey, 1837; E. S. Hall, 1839; F. C. Brownell, 1839; J. W. Agnew, 1839; and E. S. P. Bedford, 1843. All of these were men of outstanding quality.

Late in 1837 death brought to an end James Scott's long service as colonial surgeon. His private practice was very large and is said to have brought in £2,000 *per annum*, an enormous amount for that period. Two years before his death his official status was reduced, and Dr. John Arthur, appointed as deputy inspector-general and principal medical officer of hospitals, assumed control of the medical department. His administration was not to be for long. His difficult and controversial temperament led after considerable correspondence to his being suspended by Sir John Franklin in 1838. In the following year he was retired on half-pay. Dr. John F. Clark was appointed his successor, with instructions to model the department on army medical lines. His report on local conditions was not acceptable to the home authorities, who in a subsequent dispatch reaffirmed their original instructions. Dr. Clark criticized this dispatch adversely, stating that he declined with thanks the offer of half-pay army and navy medical officers for colonial services. At the same time he stressed the need for new hospitals at Hobart Town and Launceston, and (this is of great interest) recommended *inter alia* the recruiting of practitioners to the medical services from among the sons of the colonists. In 1844 this able administrator was transferred to India as inspector of hospitals. The third deputy inspector-general and principal medical officer, Dr. John Robertson, controlled the service for three years, and was succeeded by Dr. John McDonald, who died in the colony on July 10, 1849.

The administration just outlined was concerned almost entirely with the penal system, and was undoubtedly adequate and efficient.

It is perhaps of greater interest to turn to the non-official medical men who, unassisted and indeed in certain cases hindered by the official world, took up the difficult work of the care of the free community. The forerunner of these was Thomas Birch, surgeon to the whaler *Dubuc*. This ship in 1808 was condemned as unseaworthy at Hobart Town. Birch remained here, and with his interest in the cargo set up, not as a medical man, but as a merchant. The family tradition is that he gave his services professionally to the poor. His interests, however, were in ships, which he came to own, and which by their yield of whale oil, seal skins and Huon pine, soon amassed for him a fortune. As a merchant adventurer he was concerned in the discovery of Macquarie Harbour and Port Davey, and his palatial home of brick, built in 1815 and known as Macquarie House, still stands. Here he was host to Colonel and Mrs. Macquarie and their son Lachlan. He had several estates in the country. Immediately after his death this notice by his executors appeared in *The Hobart Town Gazette* of April 12, 1821:

> One hundred pounds reward. Whereas the vault wherein the remains of the late Thomas William Birch Esq., were yesterday deposited, was, either last night, or early this morning, broken into, the body removed from the coffin and its habiliments, the coffin plate, etc. feloniously stolen and carried away. The above reward will be given to . . . on his or their conviction.

Other early arrivals were: Dr. H. J. Westbrock, 1820; Dr. James Murdoch, 1822; William Paten, 1823; William Crowther, 1825;[4] Dr. Margetts (apothecary); and J. Fordyce Storey, 1828. Later comers were H. L. Lloyd, 1832; W. H. De Dassell, 1833; J. R. Kenworthy, 1834; James Grant, 1835; and William Pugh, 1835. Some of these men promptly accepted government appointments; for the others, unless they were men of means, the outlook was difficult. They had one asset, however, as up to the late years between 1820 and 1830 each of the free settlers was entitled to a grant of 400 acres and in certain cases a town allotment. Further grants could be had in proportion to the value of the money or goods each brought to the colony.

James Murdoch was most fortunate in his selection of "Craigow", which still remains in the possession of his descendants. He practised first at Hobart Town and later at Cambridge. A man of culture and individuality, he early offered his services to the government in the analysis of the mineral and vegetable products of the island. At his Risdon property, "Paradise Farm", he cultivated plants and scrubs for their medicinal properties, distilling such products as lavender, rosemary and peppermint waters. By 1834 he had cultivated the opium poppy and was using its derivatives in his practice. From "Craigow" in 1828 he conducted a long and spirited newspaper controversy

with Dr. Scott and Dr. Garrett in reference to the latter's reputed neglect in the management of a midwifery case in the district. Murdoch's end was sudden, as he collapsed when on his horse in Macquarie Street and died immediately—probably the first case of coronary occlusion among the local medical profession.

The journal of William Pugh is still extant, although I have seen only extracts from it.[6] As ship's surgeon to the barque *Derwent*, he describes in some detail his arrival at Hobart Town (1835). He remarks: "with regard to the prospects afforded from his profession that it was entirely overdone in the colony and unless I could obtain a government appointment there was no opening." Continuing his voyage to Sydney and finding prospects no better, he returned to Hobart Town and decided to see how things were in Launceston. The journey was made on foot, as in his own words, "I considered that to make the journey on foot would be less expensive and would also allow of my making more enquiries on my route than it would be possible to do on a coach". With his companion he walked 39 miles on the first day, and staying with such settlers as Harrison and Kermode *en route*, eventually a month later arrived at Launceston. Near the Nile he met Mr. Wedge (one of the moving spirits of the Port Phillip Association) who offered him the post of surgeon to the new settlement about to be formed on the Yarra. Pugh, however, decided to practise at Launceston, and the little town obtained a first-class man. Apart from his profession he was a cultivated scientist. This is not surprising, seeing that his mother was sister to Robert Brown, "the prince of botanists". R. McCormack, M.D., R.M., surgeon, botanist and naturalist to Sir James Clark Ross's expedition to the Antarctic, relates how, on calling at Pugh's Launceston home in search of some local scientific information, he found him acting as host to Count Strzelecki, the great Polish geologist and traveller. To have had two such eminent scientists at his breakfast table gives an indication of Pugh's status in the scientific world. His work in regard to the introduction of anæsthesia will be mentioned later.

The Years from 1830 to 1850: The Medical Service and its Hospitals.

In the period from 1830 to 1850 the government medical service reached its full expansion, while non-official practitioners established themselves in general practice in many localities. When in August, 1836, Colonel Arthur was recalled, his medical staff consisted of 19 officers—one colonial surgeon at a salary of £273 15s. *per annum*, four assistant surgeons, first class, receiving £182 10s., two assistant surgeons, second class, salary not stated, and twelve district assistant surgeons receiving £54 15s. Probably in all cases some degree of private practice was allowed. Country centres served were New Norfolk, Georgetown, Port Arthur, Ouse, Bothwell, Norfolk Plains, Waterloo Point (Swansea), Richmond, Campbelltown, Westbury, Perth, Grass Tree Hill, Brighton, Hamilton and Flinders Island. Five of these centres are today served by the Tasmanian Government Medical Service. The outlying stations, where road parties *et cetera* were working, undoubtedly had accommodation for their sick; but it was not until the period from 1836 to 1844 that the definite establishment of hospitals for country centres was undertaken. By this time these were already in use at Hobart Town, Launceston, Georgetown and New Norfolk. The fine two-story building at Port Arthur was built between 1841 and 1842. It contained 50 beds, with a separate ward for the military. Some years later a mental hospital was erected for the use of penal stations *et cetera* on Tasman's Peninsula, a settlement then comprising 9,035 souls. By 1840 hospitals were completed or being built at Westbury, Norfolk Plains (Longford), Bothwell and Oatlands. On January 1, 1841, St. Mary's Hospital at Hobart Town was opened "as a self supporting hospital, for the benefit of the labouring classes of society, to afford at a small cost medical attendance to the poor, to enable the rich to assist the destitute sick, and at the same time to encourage the efforts of the working classes in procuring aid at their own expenses". This was probably the first hospital of its type founded in Australia and will be considered again in relation to its founder, Dr. E. S. P. Bedford.

Quarantine and Medical Legislation.

So far nothing has been said as to the first and most important function of the profession—prevention of disease—or of legislation to control the practice of medicine in the colony. Before December, 1825, the affairs of Van Diemen's Land were regulated by ordinances of the Governor-in-Chief at Sydney, promulgated in the official gazette. After that date its affairs were its own concern. On October 22, 1828, the Lieutenant-Governor proclaimed regulations to prevent the introduction of infectious and contagious diseases from overseas vessels. These provided, *inter alia*, for an anchoring ground for inspection, which is still in use for the same purpose, and for the provision of a medical officer for the necessary inspection. A quarantine area at North West Bay was set aside for the use of ships in quarantine, and regulations were made to prevent unauthorized communication or visits to and from such ships. Nine years later, in 1837, the Legislative Council passed an act (I Victoria 17) to regulate the practice of medicine in Van Diemen's Land; this was in 1840 and 1842 amended and consolidated. Among other provisions a body of seven medical men, one of whom was to act as president, was to form a Court of Medical Examiners. All applicants who desired to practise as physicians, surgeons or apothecaries were required to produce to the court their degrees or diplomas, and might be certified to practise if the court was satisfied as to their credentials. Here is an interesting provision: those without such qualifications, after public examination, might be granted Letters Testimonial from the court and thus be enabled to practise in the colony. Provision was made for legally qualified medical men to receive as a pupil any male aged not under sixteen years. The existing Medical Council of Tasmania under its new title is still the old medical court and is the senior body for the Commonwealth, antedating by some months the Medical Board of New South Wales. By an act of 1837 imperial acts to provide for the attendance and remuneration of medical witnesses at coroners' inquests were extended to Van Diemen's Land. An act for the safeguarding and treatment of the insane was also passed in 1846. These successive measures were sufficient to safeguard the interests of both public and profession for many years. The first Court of Examiners was gazetted as under, on December 26, 1837: John Arthur, M.D., Principal Medical Officer, President; Adam Turnbull, M.D.; John McBraire, M.D.; John Learmonth, M.D.; Robert Officer, Esquire; William Seccombe, Esquire; E. S. P. Bedford, Esquire. Six of the court at least were government medical officers. Its minutes, still carefully tended, contain in considerable detail valuable information as to its functions and decisions.

Diseases and their Recognition.

One by one in the local papers mention is made of the familiar diseases of the Old World. As several journals were published weekly or biweekly and only perhaps one mail a month arrived from England, every use was made of such news as might be gathered from the police courts, law courts and Colonial Hospital. The Press, too, was often the only medium by which a medical man might defend his good name and obtain some redress from official neglect or injustice. So it is in the columns of our *Gazette*, *Colonial Times*, *True Colonist et cetera* that we must turn to find what epidemics were prevalent and what surgery was being done. Scurvy, of course, had been endemic from 1803 to my own student days. "Dysentery" and epidemic diarrhœa were endemic, particularly during the first three decades of the settlement. *The Hobart Town Courier* of March 23, 1835, reports "an epidemic in several parts of the country among the little children . . . they are so affected with dysentery and its progress is so fatal and rapid as to carry them off in a day or two. No less than five little infants have fallen victims to it in the township of New Norfolk alone."

"Puerperal fever", too, was epidemic at the barracks. *The Colonist*, of October 15, 1833, notes the death in child-

birth of the wife of the talented bandmaster of the 63rd Regiment, and also the death in childbirth of the wife of a private. Editorial comment is as follows:

The number of women who have recently died during their accouchement at the military barracks is . . . and can only be attributed to a want of sufficient caution against taking cold, as every possible assistance is always afforded by the medical officer. We make this remark as a caution to other females in the same delicate situation, during the present very changeable weather.

As early as 1826, a disease resembling the chicken-pox had lately prevailed among the children in town, but, as the editor remarks, "it is slight and appears to be incidental to the climate". Whooping cough was first noted towards the end of 1828, and *The Hobart Courier* states it to have been general throughout the colony.

"Catarrhal fever" (possibly influenza) made its appearance in March, 1820, and was very severe in 1827, when an unprecedented number of deaths occurred. One report reads: "The bells were constantly tolling for the dead as a result of catarrh all over the country." The aborigines were much affected; Queen Blackit died, among others. There was, too, considerable mortality among the Port Davey tribe. It will be remembered, too, how catarrhal fever decimated the aborigines when they were segregated on Flinders Island in 1839, and on a second occasion some years after when the disease followed immediately the arrival of Dr. Milligan and the settlement boat. In 1832 there was a visitation, and that of 1839-1840 mentioned above was the worst in the history of the colony. In its treatment the use of pitch pots was stated to have given good results.

"Typhoid fever" was first described by William Crowther (*The Hobart Town Gazette*, June 9, 1826), and several deaths from typhus (the terms were then synonymous) were reported from Port Dalrymple ten months later. In 1840 occurred the worst outbreak of the disease to that date, and near Richmond assistant surgeon Thomas Crichton was so overworked that he himself succumbed to it. Richmond and Grass Tree Hill were heavily attacked, and at Hobart Town there were 220 patients in the Colonial Hospital and Solomon's stores opposite, which were hired to accommodate the overflow. Many cases occurred, as might have been expected, at the jail, the women's factory and the prisoners' barracks. The high incidence among the convict class was then attributed to the poor quality of their rations.

"Measles" was recognized on January 23, 1835, and was found to be such by Crowther after the usual controversy with the medical profession. The group of patients under his care he stated to have the disease in a mild form and to be making an uneventful recovery. Epidemics also occurred in 1838 and 1842, while one of the more severe type in 1854, of uncertain origin, caused heavy mortality among the children. There was to be an extraordinary lag in the appearance of scarlet fever, although T. E. Demster[4] saw, in the winter of 1843, at the New Norfolk Hospital, a private of the 63rd Regiment who had a severe and obvious attack of scarlet fever. The first epidemic, noted as having been derived from Sydney, occurred in 1842 at Hobart Town. A Launceston paper inclined to attribute this to a want of cleanliness in that town. Next year it was prevalent in Launceston, and a son of Dr. Matthew Garrett died of it after an illness of only eighteen hours. Ten years later it was prevalent in a mild form, and *The Colonial Times* notes that "the malady is on the decline, but it has invalided many circles and has left gaps that time will never close". Dr. E. S. P. Bedford wrote a most interesting description of the epidemic in the *Papers and Proceedings of the Royal Society of Tasmania* for 1854. The total number of deaths was as follows: 1852, 29; 1854, 230. In Dr. Bedford's series of 99 cases (three puerperal) there were nine deaths—a mortality rate of over 10%. So far no diagnosis had been made of diphtheria, which in view of its heavy incidence during this century is extraordinary. We find, however, in *The Launceston Examiner* (September 1, 1853) a paragraph recording that "a high rate of mortality occurred among children from croup and fever". E. S. Hall noticed that diphtheria was first observed almost simultaneously in two country districts in the island during January, 1859. His tables for croup give an average death rate of just under 16 *per annum* for the five years 1851-1855 in Hobart Town alone. My own impression is that diphtheritic croup had been endemic in the island for years before these dates. An interesting diagnosis was that in the garrison of a case of hydatid disease (*The Hobart Town Courier*, July 25, 1833).

Developments during the Years from 1840 to 1850 and the End of the Penal Era.

The forties were to see widespread changes. The great prosperity of the thirties, due to the steady influx of free settlers and increased trade, had given way to our first large-scale depression. With the advent of Sir John Franklin changes were made in the penal administration. Assignment of convicts was replaced by the probation system. This provided for stations at many localities throughout the more settled parts of the island, where bodies of convicts, sometimes several hundreds in number, were supposed to be employed in road making and other public utilities. Such stations were at Maria Island, Bridgewater, Fingal, Brown's River and Rocky Hills, to name only a few. How the prisoners put in their time at the last-mentioned station is told by the Tasmanian writer Louisa Ann Meredith, who lived near by.[5] These stations were staffed by district assistant surgeons, whose duties included the treatment of all government employees, civilians, military police and prisoners in jails, as well as attendance at all corporal punishments. The salary paid was £182 10s. *per annum*, and there was perhaps some opportunity for private practice. The hospitals attached to such stations were primitive and there was a surgeon's house. Of such hospitals there were in 1844 no less than 30, and the daily number of patients in all was 760. Four years later there were on Tasman Peninsula alone seven medical establishments in addition to the large hospitals at Port Arthur and Impression Bay. This last invalid depot had a staff of two, Dr. W. Benson and Dr. Eckford, whose respective salaries were £1 and 10s. *per diem*. Described in 1856 as being "a miserable place", it was closed some time between 1860 and 1870.

Meanwhile, Saint Mary's Hospital, Hobart Town, had been opened on January 1, 1841. It began with a two-story house in Campbell Street, close to the Theatre Royal, which, with a modern veranda, is still in use as a boarding house. It was an attempt to found a hospital for the working classes as opposed to the usual inmates of His Majesty's Colonial Hospital, who were paupers if not convicts or ticket-of-leave men. Its fees were 2s. per day or 3s. in the sanatorium (possibly an intermediate ward), and no charity was expected. Under its founder, Dr. E. S. P. Bedford, it achieved immediate success, and soon new and larger buildings were found to be necessary. These were built and are still in use as that part of the Lands Office at the corner of Davey Street and Salamanca Place. Its foundation stone, laid on June 23, 1847, is still in position. With William Bedford, in the latter years of its existence, was associated Mr. Henry Butler, F.R.C.S. Here it is of interest to note that in November, 1850, Dr. Kevin Izod O'Doherty, one of the Irish exiles of 1848, and a medical graduate, who had been practising under Dr. E. Swarbreck Hall at Oatlands, was appointed to the staff of Saint Mary's Hospital. He was at a later date to return to Ireland, where he practised for some years. The call of Australia was, however, too strong for him, and the latter part of his life was passed in Brisbane, where he practised as a physician and was for a time a member of the Legislative Assembly of Queensland.

The Introduction of Anæsthetics.

W. Pugh, of Launceston, led the way for Australia when on June 7, 1847, he operated upon two patients under ether anæsthesia.[6] In the first case, one of tumour of the jaw, the anæsthetic was very poor; in the second, one of cataract, the anæsthetic was good. The Press was represented on this occasion, which, it should be noted, was only eight months after Morton first administered

ether at the Massachusetts Hospital, and but five and a half months after the first occasion on which ether was used in England, when Liston amputated a leg at University College Hospital. One week later, Agnew employed it at His Majesty's Colonial Hospital, where before the end of the year Seccombe and McDonald also made use of it. When on October 13, 1847, a boy, aged six years, mentioned as the youngest person to whom ether had been given, was operated upon by Dr. Bedford, Agnew and W. L. Crowther were present. It is not stated who gave the anæsthetic. W. L. Crowther had returned to Hobart Town on January 1, 1842. He had taken the conjoint diploma of Saint Thomas's Hospital and afterwards had spent a year at the Hôtel Dieu at Paris and at other hospitals in that city. This was the period of Louis and others, when the post-graduate facilities were the most attractive in Europe. It is probable that Crowther was the first son of a colonist to return and take up practice in Tasmania. Here an interesting fact must be mentioned. The priority of Van Diemen's Land in this field was due to the Lord Bishop of Tasmania, the Right Reverend F. R. Nixon. He sent to the colony two sets of apparatus for the inhalation of sulphuric ether. One went to Pugh, at Saint John's Hospital, Launceston, and the other to Bedford, probably for use at Saint Mary's Hospital. In each case "with thoughtful care a supply of ether was sent with the inhaler" (*The Hobart Town Courier*, September 8, 1847). E. Hobson, Scott's brilliant pupil, was one of the first to use it in Melbourne. Ten months after the introduction of ether, chloroform was being used at Sydney. Some five weeks after, on May 19 and 20, 1848, McDonald and Agnew administered chloroform at the Colonial Hospital. For McDonald the chloroform was made locally at Wilkinson's establishment. Two months later, W. L. Crowther, in the second of two cases of lithotomy, used this anæsthetic. In the first few months two fatalities occurred, one at Sydney, the other at Hobart. White and Motherwell were the anæsthetists concerned, and as the operations were respectively ligature of the common carotid artery and tracheotomy, the anæsthetists may not have been altogether to blame.

Medical Education in Van Diemen's Land.

Some mention must be made of medical education in Van Diemen's Land. Three names, those of William Crowther, E. S. Hall and E. S. P. Bedford, are particularly associated with it. The first of these, between 1832 and 1834, conducted a long correspondence with Colonel Arthur in reference to the admission of pupils of surgeons to the Colonial Hospital to attend operations and dissections of the bodies of subjects given over to the law. Although both the Lieutenant-Governor and the Colonial Secretary were in favour of his request, the principal surgeon, James Scott, refused these concessions. He pointed out that it was no part of his duty to educate the pupils of private practitioners, and in this way had the matter shelved during the period of his appointment. Scott, however, educated at least one pupil of his own, E. D. Hobson, before this time. Crowther had at least three pupils in his own practice and again brought forward the need of hospital facilities for them. On this occasion (November 27, 1837) he approached the Legislative Council by a long address in which he urged, *inter alia*, that the Colonial Hospital be thrown open to students and that an anatomical museum or even a colonial school of medicine be founded there. Again nothing was done, and it was some years after his death before Dr. E. Swarbreck Hall actually taught pupils at the hospital. Hall has been worthily described by J. H. L. Cumpston.[8] as "Australia's first sanitarian". I shall not attempt here to trace his career in Van Diemen's Land. From his arrival in 1833 he was conspicuous by his work in epidemiology and public health. In 1854 he was conducting a medical school at the Colonial Hospital, where he was resident medical officer. His advertisement states that 300 beds were available, and instruction was given in anatomy, physiology, pharmacy, *materia medica*, chemistry, midwifery, surgery and the practice of physic. He adds: "Many of the most eminent practitioners in this and the neighbouring colonies were educated in this institution." He points out that gentlemen educated as above are eligible for Letters Testimonial enabling them to practise in the island. Dr. E. S. P. Bedford, of Saint Mary's Hospital, proposed in 1856 to found a medical school; but his suggestions were not in any way helped or forwarded by the Government or Press. Bedford gave the names, in a prospectus, of no fewer than eight pupils he had previously educated here, who had later obtained their diplomas in English colleges.

With the coming of responsible government in 1853 there was a reorganization of His Majesty's Colonial Hospital, which became the Hobart General Hospital and was provided with a resident and an honorary staff. Saint Mary's Hospital unfortunately ceased to function.

This brings me to the end of the convict era and of Home administration. Far more has been omitted than placed on record. To sum up, the early period of a complete government medical service gradually became a highly organized medical service to the penal system, with independent practitioners attending the free elements of the colony. By May, 1853, such men as Officer, Agnew and Hall had joined the men in private practice and the era of the general practitioner, which was to last until 1914, had begun. Now, after 138 years, we see the wheel turning full circle, a partial government medical service in being, and national insurance—long overdue—rapidly approaching. Its advent I for one shall welcome as being in the best interests of the community as a whole.

Acknowledgements.

Only Miss A. L. Wayne, of the Chief Secretary's Department, knows how much of what I have written has been made available to me by her admirable research. Dr. F. Watson's "Historical Records of Australia", Series 3, have been largely drawn upon.

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Reviews.

EARLY TREATMENT IN PSYCHIATRY.

"THE Early Treatment of Nervous and Mental Disorders", by Dr. W. Lindesay Neustatter,[1] is well worth being read not only by general practitioners, for whom it is intended, but also by psychiatrists, whether these be in private or institutional practice, for the outlook of the author is refreshingly frank in regard to the limitations of treatment, as well as being well balanced.

As one would expect, there is a section on ætiology and one on early diagnosis preceding a discussion on general therapeutic techniques. This is followed by a section on the treatment of specific disorders both in adults and children, and a chapter on the influence of psychotherapy in general medical disorders, while an appendix is added dealing with war neuroses.

It is difficult to find fault with the author's discussion of any of these problems. The book is easy to read and seems to fill a gap in psychiatric literature.

[1] "The Early Treatment of Nervous and Mental Disorders", by W. L. Neustatter, B.Sc., M.B., B.S., M.R.C.P.; 1940. London: J. and A. Churchill. Demy 8vo, pp. 391. Price: 15s. net.

The Medical Journal of Australia

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PENNY WISE AND POUND FOOLISH: AN AUSTRALIAN ARMY FAILURE.

THE subject of mass radiography has been discussed in this journal on previous occasions, especially in regard to the examination of recruits for the defence forces. Since the time when de Abreu, of Brazil, in 1938 described a method for making miniature X-ray photographs of the chest by photographing on a cinematograph film the image produced by X rays on a fluorescent screen, much progress has been made and mass miniature radiography has become a routine procedure in the examination of recruits before their acceptance for enlistment as members of the second Australian Imperial Force. That this form of examination is valuable is generally recognized; any doubt that may remain in the minds of medical or non-medical persons will be dispelled by perusal of the papers by Bruce White and B. P. Anderson Stuart, published in this issue. White reports that among 40,000 films examined, 365 were found that gave evidence of tuberculous infection. Of the 365 cases of tuberculosis, 156 were regarded as "possibly active" and 209 as "possibly inactive". All men whose films taken by microfluorography showed suspicious shadows, were sent for and were examined again by the large film method. After a full history was taken and a careful clinical examination had been made, suspects were sent to a pathologist to be subjected to a Mantoux test and to have their blood sedimentation rate determined. They then reported with an empty stomach for gastric lavage, and the contents of the stomach were examined for acid-fast bacilli. Their fate as recruits was subsequently determined by a special medical board. It cannot be too strongly insisted that the only way in which the diagnosis of active tuberculosis of the lungs can be determined beyond doubt is by the recovery of the tubercle bacillus. In the issue of May 10, 1941, special reference was made in these columns to the work of Reginald Webster in Melbourne. Webster reported that in his investigation of recruits for the army he used cultivation methods and guinea-pig inoculation, and he showed that it was possible by his several procedures to determine whether a lesion that was under suspicion was actually discharging bacilli or not. There is no doubt that the methods used by Webster should be adopted by medical boards in the army as well as by clinicians in private and hospital practice. It should be pointed out that White recognizes the importance of Webster's work. He has designated the lesions in his cases as "possibly" active or inactive, and he reminds clinicians that Webster's work confirms the fact that it is impossbile to state from the appearance of an X-ray film that a tuberculous lesion has healed. From the foregoing it will be clear that medical examiners are able to determine whether a person has a lesion in his lungs and whether this lesion is active or not. It is also clear that when large numbers of men have to be examined, the investigation can best be set in train by mass miniature radiography.

In the course of his address Bruce White did well to refer to the pension aspect of this question. No one is likely to challenge his statement that the chief reason for the routine examination of recruits to the Australian Imperial Force has been the detection of pulmonary tuberculosis and that it was considered necessary chiefly on account of the pension costs. The total of nearly seven million pounds paid in pensions to soldiers on account of pulmonary tuberculosis in connexion with the war of 1914-1918 is staggering, and this sum does not include what has been paid to dependants or what has been spent on medical treatment. That some of the persons drawing pensions for tuberculosis are not suffering from that disease at all is a reflection on the Australian pension system and opens up questions that are outside the present discussion. The expense to the country of each tuberculous soldier is somewhere in the neighbourhood of £3,000, and White estimates that by the examination of the 40,000 covered by his report the country has been saved more than one million pounds. But it is not only in pensions that a saving is effected. When tuberculous soldiers are excluded from an army, potential sources of infection of non-tuberculous soldiers are removed. More than this, when recruits are rejected from the army, sources for the possible infection of civilians are laid bare, contacts are discovered and may be submitted to examination. Lastly, the recruit whose incipient tuberculosis is discovered, may and probably will feel aggrieved because of his rejection for service; but he does benefit by the process, because he can receive early treatment and in all probability be cured of his malady. In these circumstances it would be impossible to estimate in terms either of money or of lives the enormous saving that has already been effected for Australia in the present war by the routine radiological examination of recruits, in which the use of the thirty-five millimetre radiographic film has been the first step.

Soon after the successful use of miniature radiography in the examination of recruits for the Australian Imperial Force was reported, the Federal Council of the British Medical Association, at the request of the Victorian Branch, recommended to the Federal Government that X-ray examination of the chest should form part of the medical examination of all persons called up for compulsory training in Australia. This decision was taken at the last meeting of the Federal Council (see THE MEDICAL JOURNAL OF AUSTRALIA, April 12, 1941). At the close of the discussion on the papers by Bruce White and B. P. Anderson Stuart, W. F. Simmons, who is a member of the Federal Council and who was chairman of the meeting, said that the Minister for the Army had replied to the Federal

Council that its recommendation could not be adopted. In his letter the Minister stated that adoption of the proposal would require considerable extension of plant and facilities, that the amount of time taken and the expense involved in bringing all members of the militia to the central depot for X-ray examination would not justify the adoption of the policy. Obviously the Minister's attitude is penny wise and pound foolish. But it is more than this. Refusal to extend the radiological examination of recruits to all branches of the army is not in the interests of army efficiency, since an army that is not completely healthy cannot be efficient. It is difficult to see how the refusal can be justified. The time taken for the examinations is not excessive—fifteen hundred examinations can be made in one day; and to raise the question of expense in the face of unquestionable evidence that many thousands of pounds and eventually millions can be saved, is absurd. The only possible conclusion is that the Minister is not seized with the full facts and their significance. It is to be hoped that the Federal Council will not let the matter drop, but will approach the Minister again, preferably by deputation. This deputation should include one or more members of the profession whose experience and authority in this matter could not be questioned. In the presentation of the matter to the Minister it might be useful to put forward an alternative suggestion according to which the Mantoux test would be applied to all recruits and only those who reacted would be subjected to X-ray examination and all other tests described recently by Webster. X-ray examination as an initial procedure is preferable because it gives without delay information regarding the state of the lungs that is most needed. A reaction to the Mantoux test shows that the body has had to deal with a tuberculous infection and no more than that. The Mantoux test, however, could be applied in the country at different centres by an expert sent there for the purpose; it would then be necessary to send to the central depot for radiological examination only those who gave a reaction. In any case the matter must not be allowed to rest where it is; if the Minister has the facts presented to him as they really are, he will probably follow the Federal Council's original advice.

Current Comment.

HANS ZINSSER AND HIS STUDIES ON TYPHUS FEVER.

SOME words carry horror in their very sound, and typhus in the past has been one of these. It has perhaps of late years not quite so dread a ring, since several different forms of typhus, some comparatively mild, have been described. But with a war such as the present the spectre of epidemic typhus raises its head; together with famine it has always followed in the wake of war in Europe. This time, however, there is a possibility of preventing its spread; and that this is so is due largely to the work of Hans Zinsser. It is tragic that he should have died just when further work on this subject is of such vital importance, just when the stage is set for a trial of immunization against typhus in the field. Peter K. Olitsky[1] has published a lecture, read before the University of Cincinnati, on Hans Zinsser and his work. Zinsser first became interested in typhus in 1915, when he went to Serbia as a member of the American Red Cross Sanitary Commission, on the typhus commission organized by Dr. Richard P. Strong. Olitsky quotes Zinsser's own words:

> I gathered a great deal of information about the clinical (and pathological) aspects of the disease, did a great many autopsies and learned the things that one can learn about typhus by living in an epidemic region. But scientific studies were hampered not by any lack of opportunity or equipment, but rather by the fact that in typhus investigation at that time there was much underbrush to be cleared away. Before the true causes of the disease were uncovered, almost every known micro-organism had, at some time or other, been implicated.

The study thus begun came to fruition during the last ten years of Zinsser's life, from 1930 onwards, when he and his associates, notably Castaneda, engaged in an energetic research into rickettsial diseases. Much work had been done from 1915 to 1930, so that Zinsser had a fairly solid foundation on which to build. The "underbrush" of which he had complained had been fairly well cleared away. There were two main reasons for this: one the prodigious numbers of victims of the disease during the first World War and the post-war period, and the other the discovery by Nicolle and others in 1911 that guinea-pigs were susceptible to experimental typhus. In 1916 da Rocha-Lima found in typhus-infected lice enormous numbers of minute microorganisms packed tightly within the cells of the gut. He called them *Rickettsia*, after Ricketts, who in 1906 first called attention to them, having seen them in stained film preparations of the blood of man, monkey and guinea-pig and in ticks infected with Rocky Mountain spotted fever. In 1916 Weil and Felix discovered that agglutination occurred when the serum of a typhus patient was added to an emulsion of *Bacillus proteus*, thus making a diagnostic test available. Spielmeyer in 1919 and Wolbach and others in 1922 showed that typhus fever was primarily a disease of the smaller blood vessels, chiefly those of the skin, the brain and the skeletal muscles, and to a less extent the viscera.

Active and passive immunity had been produced both in man and in laboratory animals before 1930, but much work remained to be done before immunization could become practicable. Zinsser began his work of creating order out of the mass of accumulated evidence by a classification of the typhus group of diseases. Classical typhus fever, which is also called historical, European or epidemic typhus, occurs as a rule in Europe, but now and then arises in association with the murine form in Mexico, South America, South Africa and Asia. The source of the infection is man or typhus-infected human lice. Murine typhus fever, also called New World or endemic typhus, is found in many parts of the world. The reservoir of the infective agent is rats, possibly also mice, and infection is conveyed from rat to rat by fleas or by rat lice, and from rat to man by fleas. Murine typhus may be mild, but it can develop into epidemics of severe fulminating infection. Another form of endemic typhus, known as Brill's disease, was shown by Zinsser to be a recrudescence of an infection acquired years previously, so that in this form man himself becomes the carrier of the disease and the reservoir of infection. Having thus mapped out the strongholds of typhus, Zinsser set about the problem of prevention, working energetically "with heart and hand". The results of passive immunization had not been satisfactory. With regard to active immunization, the use of blood or tissues containing living rickettsiæ had been tried, but had proved dangerous, and Zinsser saw the necessity of using killed rickettsiæ as the immunizing agent. The difficulty lay in the cultivation of a sufficiently large number of organisms. Weigl's methods were effective but cumbersome, since the contents of 50 to 100 lice sufficed for the immunization of only one person, and the inoculated insects had to be fed for a week or more on immune individuals to obtain the blood necessary for a good yield of rickettsiæ. At length tissue culture was tried and in 1930 Zinsser, Fitzpatrick and Wei announced the preparation of so-called agar-tissue culture medium, a method which proved satisfactory for the cultivation of most rickettsial organisms and of certain viruses. A final modification was the employment of the yolk sac technique for the production of enormous numbers of rickettsiæ.

[1] *The Journal of the American Medical Association*, March 8, 1941.

This consists of the inoculation of suspensions of micro-organisms through the air-sac end into the yolk of a five or six day incubated hen's egg. That this method is practicable is shown by the fact that if all the embryonic tissue of two infected eggs is used, as much as 550 cubic centimetres of vaccine can be produced. These two methods of culture have been combined. Writing during last March, Olitsky states that tests of these preparations are in actual use, and that the stage is set for a trial of Zinsser's work, set against the bitter background of war, epidemic typhus and approaching winter in Europe.

ECONOMY IN THE LABORATORY.

IN a recent paper entitled "Laboratory Procedures, Apparatus and Improvizations", C. L. Pasricha and others make some valuable suggestions as to the development of economical methods in the laboratory.[1] Pasricha and K. Banerjee remark on the frequency of breakage of glass Petri dishes. Large numbers of unpaired dishes accumulate in a laboratory and are eventually discarded. Pasricha and Banerjee therefore employ Petri dish lids stamped out of aluminium. They state that these lids have no deleterious effect on the growth of organisms. In addition to the lids, several pairs of aluminium dishes may be kept on hand for use in an emergency for plating media; they are sterilized over a naked flame, and the medium is poured into them when they cool. Pasricha and Banerjee also recommend the use of unglazed porcelain covers to Petri dishes, preferring them even to glass. They state that they have the advantage of allowing the rapid evaporation of water of condensation so that no excessive moisture remains on the surface of the medium. "They are particularly valuable during the rainy season when owing to the humid atmosphere it is difficult to keep a stock of satisfactorily dry plates." Porcelain covers cost less than glass.

Pasricha and Banerjee point out that the cost of glass cover-slips has increased greatly since the outbreak of war. X-ray films or photographic films or mica may be substituted. The photographic coating is readily removed from an old film by hot water. The clear film is then cut into cover-slips of the required size by scissors or a photograph trimming machine. The blue tinge of an X-ray film is not a disadvantage; in fact it is rather restful, especially when artificial light is used. If the microscopist does not like it he can easily remove it by soaking the film in acidified methylated spirit. These cellulose cover-slips have a tendency to curl and therefore are not suitable for permanent mounting or for use with an oil-immersion lens. Satisfactory cover-slips for any purpose may be made of mica. They can be made of any thickness; they are free of scratches, and they lie perfectly flat. A mica slip of 0·025 millimetre in thickness is easier to handle than a thin glass slip. The material for making 100 mica slips costs a little less than one anna (about a penny).

Pasricha and Banerjee also describe a "simple easily-prepared dust cover for microscope and other apparatus". It is made of five X-ray films bordered with tin. The films are united at their metal edges by solder to form a box that is open at one end. The joints may be reinforced by bent strips of tin. Such covers have been in continuous use for more than three years. They stand a great deal of rough treatment. Because of their lightness they can be handled without fear of damage to any projecting part of a microscope or other piece of apparatus. A glass bell jar, on the other hand, has to be handled with great care. Covers of different sizes may be made in the laboratory, and it is possible to make a "nest" of them and thus to save space in storage or transport. As an additional refinement, pieces of rubber tubing, split longitudinally, may be fixed to the free edges.

In discussing war-time economy in the laboratory, Pasricha mentions a number of other uses to which old X-ray films may be put. For example, they may be cut into suitable shapes and used for the framing of photographs, charts or diagrams. A solution of cellulose in acetone or alcohol and ether or amyl acetate may be used as a substitute for collodion as a cement for mending broken glass, and (when dried) as a material for capping bottles.

Liquid paraffin may be used instead of cedarwood oil in microscopy. Actually many oils can be substituted for cedarwood oil. Groundnut (peanut) oil is satisfactory, excepting where critical definition is required. Hydnocarpus oil may also be used.

The cost of flasks has increased considerably. Bottles may be used in their stead. The quality of glass in a bottle may be tested according to the method set out in the appendix to the British Pharmacopœia. Bottles have been used for the preparation and storage of media, and have proved satisfactory. They stand sterilization well.

For transmitting small pathological specimens by post Pasricha has employed a method that might be found of use in parts of Australia. Instead of packing cases he uses a section of bamboo. One end of the piece of bamboo is closed by the natural joint; the other end may be blocked by a cork or piece of pith and paper, reinforced by wire.

Pasricha concludes with expressing the hope that other workers will be stimulated to develop alternative laboratory methods for the sake of economy, and to report them. "It is the simple and obvious alternatives that are so valuable and are so often missed."

These suggestions by Pasricha and his colleagues should be of interest not only to the pathologist and bacteriologist, but also to the medical practitioner who engages in casual laboratory work in the course of his practice. Australians are not lacking in inventive genius, and it is safe to say that there are many simple procedures commonly employed and inexpensive apparatus in everyday use in laboratories and consulting rooms throughout the Commonwealth. Many of these, once in use, seem so simple and obvious that the people who have devised them do not think it worth while to describe them for the benefit of their colleagues. We would suggest to them that it is worth while.

[1] *The Indian Medical Gazette*, May, 1941.

"MR. PUNCH" A HUNDRED YEARS OLD.

OUR buoyant contemporary, *Punch, or The London Charivari*, will complete its hundredth year of publication on July 17, 1941. As the paper circulates widely among the medical profession it is fitting that we should notice the event and offer our congratulations. On turning the pages of any of the two hundred volumes of the weekly tonic dispensed by "Mr. Punch", one may find many examples of the humours of medical practice, and a large number of these have been collected under the title of "Mr. Punch among the Doctors". To this collection we could add a recent story, which might be told against many doctors, of a patient who was reading a well-thumbed *Punch* in the waiting room when the doctor looked in; on the doctor remarking by way of opening the conversation that the paper was nearly a hundred years old, the patient indicated the tattered pages and replied dryly that he could well believe it. Mr. Punch's interest in the medical profession has been lifelong; in 1841 appeared a series of articles entitled "The Physiology of a London Medical Student", of great historical interest and giving an intimate picture of a generation of students rougher and noisier and less diligent than those of today, but at heart not so very different. The medical profession has also taken an interest in Mr. Punch—professionally; a few years ago Dr. H. Letheby Tidy wrote a learned letter to *The British Medical Journal* on the subject of Mr. Punch's hump. We know a physician who is accustomed to prescribe an old bound volume of *Punch* for suitable patients as a cure for insomnia; not that the reading matter is of itself provocative of slumber, but he holds that a little light and amusing reading, illuminated by humorous drawings, brings relaxation and distraction from the worries of the day, so that after a short while the tired reader is ready for sleep. And so we send our good wishes to the ever-green centenarian. Long may the symbiosis of *Punch* and the London charivari continue with mutual benefit and to the greater gaiety of nations.

Abstracts from Medical Literature.

BACTERIOLOGY AND IMMUNOLOGY.

Communicability of Hæmolytic Streptococci.

ALVIN F. COBURN AND RUTH H. PANTI (*The Journal of Experimental Medicine*, April, 1941) have studied the interaction of host and bacterium in the development of communicability by the hæmolytic streptococcus. They observed a small epidemic during a season when the incidence of hæmolytic streptococcus infection generally was low. The origin of the outbreak was the illness of a child suffering from bronchiectasis, who after an exacerbation was found to harbour a Type 12 streptococcus. Three other infants in the same ward developed skin infections which proved to have the same organism, and one child had an *otitis media*. A little later seven nurses became affected by a severe pharyngitis lasting three to ten days. The patients were isolated, but nine more nurses and four children contracted the same pharyngitis. One boy, who was at intervals on the same floor but did not come into contact with the patients, also developed a Type 12 infection, and an intern, two parent visitors, and six more nurses were infected. Finally one child, who had had a blood count, developed a Type 12 infection in the puncture wound. It was noted that the nurses all contracted their infections from the children; they did not spread it between themselves; but the spread between children could not be controlled by any form of isolation. Some nurses carried the infecting organism for as long as sixty days. Various factors were followed which had been thought significant in the spread in other epidemics, but their control did not affect this one. Bacteriological investigations revealed that some cultures originally considered "negative" from some of these patients contained slightly atypical hæmolytic streptococci which became typical on subculture onto media rich in serum when the serum was obtained from adult human donors, but tended to continue in the production of a certain number of atypical forms when the serum was obtained from infants under the age of two years. Both forms were avirulent for mice, produced erythrogenic toxin, and agglutinated only with Type 12 antiserum. The serum of affected adults contained precipitins and antistreptolysins, while these antibodies were almost absent from the infants' serum. The authors believe that they have described a transient state of the hæmolytic streptococcus, which they called communicability, the capacity of the organism readily to establish itself in the tissues of a new host.

Coagulase Test for Staphylococci.

ALAN FISK (*The Journal of Experimental Pathology*, October, 1940) has investigated the technique of the coagulase test for staphylococci. The property of coagulating citrated plasma has been widely recognized as a useful indication that a given staphylococcus is pathogenic, and the author was seeking simplicity, speed and reliability in the performance of the test. Using citrate in different concentrations, plasma from different sources, and organisms grown on various media, the author carried out a series of tests at different temperatures; he succeeded in defining conditions under which the test showed least variation in results. Sodium citrate, 0·5% solution, was used and normal saline solution was used to dilute citrated plasma 1 in 10. Broth cultures of not more than twelve hours' incubation were added in 0·05 cubic centimetre amounts to 0·5 cubic centimetre of diluted plasma and incubated with controls at 37° C. Readings were taken at half-hourly intervals up to six hours, the tubes being inspected for a jelly-like coagulum in the plasma. This was most frequently present after one hour.

Cross-Infection in Diphtheria Wards.

H. D. WRIGHT, H. R. SHONE AND J. R. TUCKER (*The Journal of Pathology and Bacteriology*, January, 1941) have studied the effect of nursing conditions on the frequency of cross-infection in cases of diphtheria in a fever hospital. The change in type of the infecting organism was utilized as a ready means of testing the occurrence of cross-infection. In an ordinary open ward the incidence of cross-infection was high, especially amongst patients whose stay was longer than six weeks. When patients were nursed in cubicles there was a tendency to select carriers for this form of isolation, but there were no instances of cross-infection. Bed isolation wards were also observed, in which the distance between beds was not less than ten feet, a separate gown was worn by the nurse at the bedside of each patient and separate utensils were provided, and the attending nurse was required to wash before and after each attendance on a patient. In twenty-bed wards this method gave results little better than those obtained in open wards, although it was noticed that when the staff was permanent results were better than when there were frequent changes. The sources of cross-infection were studied, and while close contact between patients, as when convalescents visited sick patients, was important, infected attendants, nurses and wardmaids also played a part. During the seven months of observation 11 of 77 nurses became infected for a longer or shorter period, varying between seven and sixty-three days. The nasal swab was more frequently positive than the throat swab. Aerial spread as a possibility was studied when carrier or contact could not be traced, and in 16 of 17 specimens of fluff, dust and débris from the dry sweeping of the ward floor virulent diphtheria bacilli were isolated, often in considerable numbers. The authors conclude that improved ward isolation or cubicle isolation will limit cross-infection, that carriers and infected dust on the floor of wards should be recognized as factors of cross-infection, and that effective prevention of contact between patients should be insisted upon.

Influenza Virus in Central Europe.

R. M. TAYLOR AND MIKLOS DREGUSS (*The Journal of Infectious Diseases*, January-February, 1941) studied influenza virus during the 1939 epidemic in central Europe. Notification of cases of "complicated influenza" is compulsory in Hungary, so workers were able to trace districts where the disease was prevalent. The methods used to isolate virus were similar to those previously described by these workers; they inoculated ferrets intranasally with filtered nasal washings obtained from patients in the first four days of the disease. The patients were bled during this period and two weeks later, and the serum was tested for antibody content by mixing it with known influenza virus and testing its protective power after injection into mice. When a rise of antibody was found in the second specimen as compared with the first, the result was considered as presumptive evidence that the patient had had an infection with influenza virus. In no case in which this test failed to produce a reaction was virus isolated from the nose. The appearance of the ferret turbinate and the ferret lung at autopsy was used as a standard of successful isolation, and it was found that emulsions prepared from the ferret turbinate were much more satisfactory for mouse passage of the virus than those prepared from lung tissue. Of the 29 specimens of nasal washing, virus was grown from 16, and of the remainder seven failed to show rise of antibody; it was presumed that the illness was not influenza. Fifteen of the 16 strains were adapted to mice and were tested against strains of virus isolated in England during the 1939 epidemic and against swine influenza virus; there appeared to be distinct differences between them in their behaviour towards their specific antisera. The sera of 45 persons ill during this epidemic were tested against some of the recently isolated virus strains, and 31 of these showed a rise of antibody of from 5 to 21 times the original titre. The authors used a technique differing slightly from that used by English workers in the preparation of the patient's nasal washings, and thought that might be the reason for the ease with which the virus was transferred to ferrets, which was one of the marked differences between the European and English viruses. The authors discuss the contrast in antibody response in man and in ferrets, and note the difficulty of making primary isolation of virus in mice.

The Use of Sulphanilamide in Lymphogranuloma.

G. M. FINDLAY (*The Journal of Experimental Pathology*, December, 1940) has investigated the action of sulphanilamide on the virus of *lymphogranuloma venereum*. As the work of Woods suggested that *p*-amino benzoic acid played the part of an essential metabolite in the growth of hæmolytic streptococci and its inactivation was an important part of the action of sulphanilamide, this was first confirmed by a repetition of Woods's experiments. Mice were inoculated intracerebrally with hæmolytic streptococci and protected with sulphanilamide; in another group mice were given sulphanilamide and *p*-amino benzoic acid, which failed to protect them. Similar experiments were then set up and virus of *lymphogranuloma venereum* was used as the infective agent; identical results were obtained. The author believes that the sulphanilamide protected the mice against the virus and that the addition of *p*-amino benzoic acid abolished the action of the sulphanilamide; this evidence he regards as supporting the theory that *p*-amino benzoic acid is an essential metabolite in the economy of this virus also. He suggests that the failure of sulphanilamide in other virus infections

may be due to the fact that either *p*-amino benzoic acid is not an essential metabolite in their growth, or else is formed by them in such amount that the chemotherapeutic action of sulphanilamide is entirely inhibited.

Takata Ara Reaction in Cerebro-Spinal Fluid.

PAUL B. SZANTI AND SAMUEL BURACK (*The Journal of Laboratory and Clinical Medicine*, April, 1941) have investigated the diagnostic significance of the Takata Ara reaction in the cerebro-spinal fluid. The reaction depends on the formation in the cerebro-spinal fluid of a colloidal protein compound which will adsorb a dye in the presence of sodium carbonate and the specific reagent. This consists of equal amounts of 0·5% mercuric oxide and 0·02% fuchsin solution. The strength of the reaction is judged by the amount of coloured precipitate and the speed of its development. In a group of patients, a large number of whom were neurosyphilitics, the result of the test was compared with the result of the Wassermann test, the gold sol curve and the cell count. This simple test showed an absolute parallellism with the gold sol curve, appeared to be more sensitive than the serological test, and had no correlation with the cell count. A small series of estimations of the globulin/albumin ratio of the fluid seemed to indicate that the Takata Ara reaction became more intense as the ratio became higher.

HYGIENE.

The Cleansing of Eating Utensils and the Evaluation of Detergents.

F. W. GILCREAS AND J. E. O'BRIEN (*American Journal of Public Health*, February, 1941) attempt to formulate laboratory tests for evaluating detergents for dish washing *et cetera*. Detergent action depends on properties of wetting, deflocculation and dispersion of solid particles, emulsification of grease, solution of chemical soiling and suppression of precipitation. Wash and rinse water, protein and greasy soilings were standardized. Marked differences were found in proprietary and other detergents. Wash water, without any detergent, was in some cases more efficient. Castile soap gave the best all-round performance against both greasy and protein soiling. Sodium metasilicate and trisodium phosphate were effective against grease but not protein soiling. Washing soda was not as useful as soap, though valuable against grease. The sulphated alcohols are useful only for hand washing, as they form excessive foam. Alkalis are ineffective by themselves. A temperature of more than 120° F. tends to bake the protein soiling.

Endemic Typhus Fever in the Southern United States of America.

HENRY E. MELENEY (*American Journal of Public Health*, March, 1941) states that endemic typhus is extending its incidence in the southern States of America. From 1922 to 1939 the number of States reporting cases has risen from three to twelve, the number of counties from 158 before 1930 to 660 in 1939. The cases reported annually have increased in number from 24 in 1922 to 376 in 1930 and to 2,942 in 1939. The chief incidence shown on the maps runs from the north-eastern through the southern to the south-western areas. Beginning in southern port cities and coming perhaps from Mexico, this rickettsial disease has spread along the railroads and highways from town to town, thanks to the migrations from one grain or food store to another of the brown rat, *Rattus norvegicus*, its reservoir host, and the tropical rat flea *Xenopsylla cheopis*, its chief vector. The rat, already an economic burden, has become a health menace. The spread of plague into this typhus area from the west would be a misfortune. Vigorous rat eradication programmes are needed.

Fæcal Examinations in Poliomyelitis.

JAMES D. TRASK AND JOHN R. PAUL (*American Journal of Public Health*, March, 1941) discuss the action to be taken in poliomyelitis. Recently tests for the virus have been made more delicate by the nasal instillation of untreated fæces, all the seven samples tested by Howe and Bodian in the first week of the disease being positive. The virus appears in the stools in abortive as well as paralytic types, in contact as well as convalescent carriers. From the nose positive results were obtained, chiefly in the first forty-eight hours. In the stools it has been found for weeks and most frequently in the stools of children under five years of age. The common form of the disease appears to be the abortive attack only recognizable in epidemics or by animal tests. These mild febrile attacks without paralysis may leave the person infective for weeks. During the epidemic of 1939 the virus was found in urban sewage (Detroit and Charleston). This implies contaminated waterways, and the authors suggest that it may give rise to passage through a non-human host rather than to direct infectivity. Water-borne infection does not explain the explosive rural outbreaks, for farms have their own water supplies and, further, epidemics have spread up as well as down river valleys. No practicable method of control for abortive cases has yet been found. The effort should be made to prevent sewage from contaminating waterways. As certain strains of virus show cutaneous infectivity, insects cannot be excluded. Birds play a part in equine encephalomyelitis, and worms in epidemic swine influenza. The authors contend that a case has been made out for the extra-human host.

The Control of Syphilis with the Intravenous Drip Technique of Massive Arsenotherapy.

GEORGE BAEHR (*American Journal of Public Health*, February, 1941), discussing the possibility of the control of syphilis with the intravenous drip technique of massive arsenotherapy, states that the arsenical in 5% glucose solution is given by intravenous drip at the rate of thirty drops a minute for ten to twelve hours a day for five successive days. The total administered is 4·0 to 4·5 grammes of "Neoarsphenamine" or up to 1·2 grammes of "Mapharsen". One hundred and eleven patients in the primary or early secondary stage of syphilis received the former, 275 the latter. "Neoarsphenamine" caused one death from hæmorrhagic encephalitis and frequent transitory sensory disturbances. "Mapharsen" in the most recent series of 125 cases, in which 1·2 grammes were given, gives 76% of patients "clear", 19% well "with Wassermann titre fading", and 95% of administrations are expected to be successful. Treatment begun within eight weeks of the primary attack seldom fails. Fever occurred in 41% of cases after the first day of treatment, secondary fever in 12%, toxicoderma in 11%. These are much less frequent than in "Neoarsphenamine" treatment. No fatalities occurred, though one patient developed frank symptoms of hæmorrhagic encephalitis and two slight symptoms. Organized treatment centres are indicated. The advantages are striking. The spread of infection is completely eliminated. Treatment is complete and the cost less, and time lost a minimum.

Secondary Attack Rates in Pneumonia.

E. S. ROGERS, MORTON ROBINS AND M. G. ARNSTEIN (*American Journal of Public Health*, February, 1941) have studied for two years a sample population in New York State with the help of public health nurses. This consisted of 3,285 index cases of "pneumonia" in households numbering 13,490 individuals as contacts. The crude secondary attack rate per 28 days was 8·2 per 1,000 household contacts. Of the 111 patients, 54 were under ten years of age, an attack rate in contacts of 16·3. This was quite independent of measles or whooping cough. The general risk of pneumonia in the community is estimated at 0·217‰. The household contact risk is therefore 37 times greater, or if the differences in seasonal contact are allowed for, 28:1. Little difference was noted whether the condition was bronchopneumonia or pneumonia.

The Germicidal Action of Cleaning Agents.

W. D. POHLE AND L. E. STUART (*The Journal of Infectious Diseases*, November-December, 1940) tested Price's conclusions that the so-called germicidal bar toilet soaps, which had been tested *in vitro*, were inactive as germicides for the "resident" bacteria of the human skin, as opposed to the "transient" surface flora, which vary considerably and are easily removed. Ten enamel basins containing two litres of distilled water were allotted for each person taking part in the test. Two grammes of granulated soap were added and the subject washed, lathered, and rinsed the hands for a two-minute period in each basin successively. One cubic centimetre of washing water was then taken, poured agar plates were made and incubated, and the colonies were enumerated. While the numerical levels varied widely with different individuals, it was found that the counts from the last four basins were uniform within the limits of experimental error. Therefore if any germicidal soap was to be tested, this technique could be followed and the new soap added at basin 5 of the series. The effect of the addition of 70% alcohol at this point was tried, and the count fell appreciably in the remaining observations in the series; petroleum ether in basin 5 affected its result alone, the later results being as in the control set. The author considered the method satisfactory although laborious; he holds that the figures prove an ideal illustration of the persistence of bacteria on the human skin.

XUM

British Medical Association News.

SCIENTIFIC.

A MEETING of the New South Wales Branch of the British Medical Association was held on May 29, 1941, at the Robert H. Todd Assembly Hall, British Medical Association House, 135, Macquarie Street, Sydney, DR. W. F. SIMMONS, the President-Elect, in the chair.

Radiography of the Chest.

DR. BRUCE WHITE read a paper entitled "Some Considerations of Mass Radiography of the Thorax, with Special Reference to its Application to Recruits for the Army" (see page 23).

DR. B. P. ANDERSON STUART read a paper entitled "Mass Radiography of the Chest" (see page 27).

DR. D. G. MAITLAND thanked the speakers for their interesting papers and the display of miniature X-ray films. He said that there was no doubt that miniature radiography had come to stay in mass survey work. He was in entire agreement with Dr. White's statement that even under the best technical conditions of X-ray examinations lesions would sometimes be missed. Like Dr. White, Dr. Maitland could recall one case in which a girl, who was severely ill, actually had tubercle bacilli in the sputum, and yet no abnormality was apparent in the lung fields in the 17-inch by 14-inch film; but one week later another X-ray examination revealed miliary spread of the lesion to both lungs, and the patient later died. Dr. Maitland thought that this was due to the rupture of a hilar gland. Such a lesion could not be seen by any method of radiology that was known. The lesion became obvious a week after the first X-ray examination because of the presence of small atelectatic areas around Koch foci. Dr. Maitland thought that that was what occurred in every such case. Another point to which he referred was the question whether a radiologist could actually tell from the appearances whether a lesion was active or quiescent. Dr. Maitland thought that he could make such a decision up to a point; but beyond that point he dared not go, because, after all, examination of an X-ray film of the chest was only part of the general clinical examination, and if the X-ray findings did not fit the others—in other words, if they did not form a true link in that chain—then it was probably the radiological diagnosis that had to be reconsidered. Radiologists ought to try to visualize the lesions that produced the shadows on the film. These shadows could be very misleading, as such conditions as carcinoma, hydatid disease and tuberculosis might simulate one another. Dr. Maitland mentioned a case in which an abscess at the apex of the right lung was diagnosed radiologically as tuberculosis of the right apex; a tooth had been extracted a fortnight earlier. Cavitation and fibrosis were present, and there were small areas of spread from the abscess to the adjacent alveoli, producing the appearances of tuberculosis. Within five months the condition had cleared up and nothing but scarring was left. Such cases were often forgotten by the clinician who asked the radiologist: "Is it tuberculosis?" The radiologist should leave the door open by stating that the appearances were "suggestive of tuberculosis" and leave it to the clinician to complete the diagnosis.

DR. A. T. NISBET said that Sir Alexander MacCormick had once said: "Never go to a medical meeting, because you are likely to get into arguments." Dr. Nisbet thoroughly disagreed with everything that had been said at the meeting. He disagreed with the interpretation of the last film that had been shown, and he disagreed with some of the costing. In January, 1940, when the First Division of the Australian Imperial Force went abroad, a contract was offered to the Commonwealth Government to take X-ray pictures of all the men on the 17-inch by 14-inch film for 8s. 6d. per head. An urgent telegram to this effect was sent to the Minister for Health, the Minister for the Army and the Director-General of Medical Services. The reply received was that Colonel Cooper would carry on his investigations on the 35-millimetre films. Dr. Nisbet asked why the small films should not be omitted altogether and the 17-inch by 14-inch films used. The Repatriation Department, for which he worked, would not have the small films, and the Deputy Commissioner, Mr. Rowe, had said that in no circumstances would he have them. Dr. Nisbet then referred to the difficulty in recording that was caused by the use of the small films. Dr. Shellshear had mentioned the fact that the films became scratched easily and had to be kept between sheets of glass. Dr. Nisbet said that at the Prince of Wales Hospital the recording system was outstanding. If an X-ray film taken years previously was required, it was brought out at once, and the most recent one of the same patient was put beside it for the clinician's inspection. It had been mentioned that the X-ray films of recruits were often examined while still wet; Dr. Nisbet thought that they might as well wait until the films were dry. With regard to the cost of mass X-ray examinations, Dr. Nisbet asked why the Mantoux test should not be performed first; a radiological examination might not be necessary if the Mantoux test did not produce a response. Dr. Nisbet admitted that Dr. Anderson Stuart and Dr. Shellshear had produced X-ray films that could not be approached by those taken in other States; he congratulated them very highly on the work they were doing, but thought that it must take a great deal of time and much expense. With regard to the cost of pensions, Dr. Nisbet thought that the extra expense on the 17-inch by 14-inch film compared with the 35-millimetre film would be 4s. or 5s. more per head; this would pay for every man examined, from major-general to private. That should be of value if it was recognized that the 17-inch by 14-inch film was the better method of examination. Dr. White had mentioned the saving of one million pounds in pensions; Dr. Nisbet asked whether the use of 17-inch by 14-inch film would not save another million. He went on to say that the Ghon's focus was also interesting to the radiologist. Dr. White had hedged somewhat as to whether he was satisfied that these areas meant that the tuberculous lesion was healed or that it was healed with tubercle bacilli enclosed in it. Did Dr. White think that they would give any sign of activity in the future? At the Waterfall Sanatorium it had been shown that even after periods of years there was no change in these nodules. No method was foolproof. Dr. White had criticized rather severely the radiologist who reported that there was, for example, "tuberculosis of the right apex". But what was the radiologist there for? The radiologist had every justification for suggesting that the lesions might or might not be tuberculous or due to actinomycosis *et cetera*. In cases in which the ribs lay over the apex of the lung, the Army and the Air Force had not gone to the expense of examination by means of 17-inch by 14-inch films, and had not used a stereoscopic apparatus. Dr. Nisbet thought it might be a great saving if a stereoscopic examination was made in all these doubtful cases. Dr. Nisbet went on to refer to apical scars. He said that on the previous day he had seen on a film seven years old an apical scar which had become acutely active. They were all very worried about apical scars, which were dangerous. Dr. Anderson Stuart had said that the apparatus for use with the 5-inch by 4-inch film was to reduce the cost of the 17-inch by 14-inch film examination; Dr. Nisbet had thought it was to improve the results of the 35-millimetre film examination.

DR. W. L. CALOV said that the radiologists seemed to be in good form, so he felt that he as a simple physician should rise and speak. First of all he wished to point out that those present, who had had the hardihood to leave their firesides, had been rewarded by hearing two good papers and witnessing an interesting demonstration. The miniature films that had been shown were so good that if the miniature films used in the examination of recruits were as good as those, the 17-inch by 14-inch films would not be necessary. Dr. Calov took it that the radiological investigation of soldiers was undertaken because it was the most important single diagnostic procedure in the diagnosis of pulmonary disease, not because it was the beginning and end of diagnosis in pulmonary disease. Dr. Calov suggested that the Chest Board (so-called), assisted by a radiologist and a bacteriologist, sometimes found it exceedingly difficult to make a diagnosis at all; how, then, he asked, could the radiologist, after one swift glance at the film shadow, state precisely the nature and extent of the pathological process taking place in the lung? Yet occasionally they found the radiologist telling almost everything that had happened. Dr. Calov was delighted with the becoming modesty of the radiologists who had spoken, because they had not pretended to interpret all the appearances; yet he had been told that some could almost estimate the number of bacteria present in a pulmonary lesion. Dr. White referred to the difficulty in obtaining a history from soldiers. Dr. Calov said that they were notorious for inaccuracies. A soldier who was trying to stay in the Army had never coughed blood, never sweated at night and had never had pleurisy; his relatives and friends were all healthy. But after he had been in the Army for a while, he might give a different history. Dr. Calov said that when the examiners obtained an affirmative answer to a question they began to suspect that the man did not wish to stay in the Army.

DR. A. J. HOOD STOBO thanked Dr. Anderson Stuart and Dr. White for their interesting papers, and Dr. Shellshear for his part in the radiological demonstration. Dr. Stobo

said that the X-ray films taken for the Air Force were practically as good as those shown. They were all very much concerned with the fate of the man who was found to have an early lesion.

Dr. Stobo then said that he was still not convinced of the fact that the sterno-mastoid muscle showed as a shadow. The author of an article in *Radiology* was careful to refer to it as "the line of the sterno-mastoid". Dr. Stobo thought it might be a good idea to find a person showing the muscle very well and to take an X-ray photograph of him, and then, after the muscle had been pinched out a little, to take another photograph and see if there was any variation.

Dr. White, in reply, thanked those who had contributed to the discussion, particularly Dr. Nisbet. Dr. White was in agreement with Dr. Maitland's remarks. He thought the radiologist had the worst end of the stick in a large number of cases. Patients were sent to him and usually no history accompanied them, and in many cases he was expected to make a diagnosis. If he did not, there was a certain number of practitioners who would say: "He is no good, he does not know his job." Dr. White felt that in his own specialty he should have a knowledge of radiology; but in regard to the radiological appearances of a fracture or a lesion elsewhere in the body, he would want the radiologist to express some sort of an opinion. Therefore he was just as guilty as those who had been mentioned. Dr. Nisbet had made some rather caustic criticisms of some of the mass radiological work; he had taken exception to the Chest Board's seeing films in the wet state. Dr. White agreed that it was possibly desirable to wait until the film was dry; but in the majority of cases the members of the board could hazard an opinion as to the pathological process present and proceed with the "boarding". Moreover, no final conclusion was reached about these cases for forty-eight hours, and by that time the film was dry and had been reported on by the radiologist. Dr. Nisbet's objection did not hold. The same objection applied to the early application of the Mantoux test. Dr. White regarded the test as a very valuable adjunct in the diagnosis of tuberculosis, particularly when it failed to produce a response. An absence of reaction, except in a few cases, was of very great value; the exceptions were a patient dying of tuberculosis, a patient in the early stages and a patient with a very old lesion, who had lost his allergy to tuberculin. But to apply the test to all members of the Army and wait forty-eight hours for a result was quite futile. With regard to what Dr. Nisbet had said about pension costs, Dr. White said that he could not follow his remarks about the possible saving of a further million pounds. Dr. White thought that the average small film was almost as diagnostic as the large film; with a good 35-millimetre film it was equally as diagnostic. Referring to calcified nodules, Dr. White said that he thought the risk that tubercle bacilli would escape from the centre was not very great. He drew Dr. Nisbet's attention to the work of Opie and Aronson, who had cultivated tubercle bacilli from nodules in the lung fields. Dr. Nisbet had suggested that a shadow at the apex of the right lung might be due to one of many lesions; Dr. White thought that if there was any doubt the radiologist should put them all in his report. Dr. White thanked Dr. Calov for his remarks. As Dr. Calov had emphasized, examiners were sadly handicapped by a lack of histories from the men, who were in the vast majority of cases unmitigated liars. But in civil practice a great deal of importance attached to the history; it was one of the most important aspects of the investigation of pulmonary tuberculosis, particularly with regard to the patient's association with someone who had had it. Dr. White agreed with Dr. Stobo in what he had said about pensions. There was a large number of men who had been drawing pensions since the last war and had never had the disease. In the course of his work at the clinics Dr. White had often seen contacts of these soldiers sent along, and he had been surprised at the large number of members of families of the men receiving such pensions who failed to react to the Mantoux test. Dr. White had checked the findings and had found no evidence of tuberculosis in a number of the soldiers.

Dr. Anderson Stuart thanked those who had joined in the discussion. He said that films of the quality shown could quite easily be duplicated on any modern equipment, such as that installed at most hospitals *et cetera*. He joined issue with Dr. Nisbet. He (Dr. Anderson Stuart) thought he had made it clear that it was not only on account of the added expense that the 17-inch by 14-inch film method was unsuitable for large surveys, but also because this method was far too cumbersome, necessitating individual handling of the large films and elaborate dark-room facilities. Films showing pathological lesions had always been checked with a large film, and in no case had the diagnosis ever been altered. Dr. Anderson Stuart agreed with Dr. Nisbet that if a radiologist saw a lesion which he considered to be tuberculous he should say so and, in addition, whenever possible, note any signs of activity, such as cavitation. By virtue of their specialized experience radiologists could in most cases express an accurate opinion as to the nature of a lesion, and it was for this opinion that the case was referred to him. Clinicians must remember that when a radiologist gave his diagnosis he was not making a dogmatic statement, but merely saying that the X-ray appearances suggested this. Dr. Anderson Stuart was in agreement with what Dr. Stobo had said about the shadow of the sterno-mastoid muscle; it was not the shadow of the actual muscle, but the shadow of the skin fold caused by the muscle. With regard to the difficulty of keeping records, Dr. Anderson Stuart said that large films had been taken in the positive cases. However, it was an easy matter to take out any 35-millimetre film with positive findings and mount them as slides. They could then be referred to later quite readily.

DR. W. F. SIMMONS, from the chair, said that those present were deeply indebted to the speakers and to Dr. Shellshear for the technical work shown. The Federal Council of the British Medical Association was very interested in mass radiographic examination of the thorax, and at its last meeting urged the Minister for the Army that all compulsory trainees should be examined in a similar manner. It was thought that such a survey would be a national contribution of practical and scientific value. A reply had been received that week from Mr. Spender; he stated that owing to the great cost he regretted that the request could not be granted. Dr. Simmons thought that the remarks of Dr. Bruce White about the saving of a million pounds might be well stressed, and that it might be possible to induce the Editor of THE MEDICAL JOURNAL OF AUSTRALIA and the daily Press to take notice of the financial side of the matter and thus draw attention to the economic as well as the scientific aspects of the matter. Dr. Simmons then proposed a vote of thanks to the speakers.

Post-Graduate Work.

COURSE IN PÆDIATRICS AT SYDNEY.

THE New South Wales Post-Graduate Committee in Medicine announces that a course in pædiatrics will be held at the Royal Alexandra Hospital for Children on July 28, 29 and 30, 1941. The programme will be as follows:

July 28, 1941.

9 to 10 a.m.—"The Sick Child": Dr. Edgar H. M. Stephen.
10 to 11 a.m.—Ward rounds: Dr. Lindsay Dey.
11.15 a.m. to 12.15 p.m.—"Chronic Bronchitis": Dr. Raymond Green.
2 to 3 p.m.—"Congenital Atresia and Stenosis of the Œsophagus": Dr. P. L. Hipsley.
3 to 3.55 p.m.—"Hydrocephalus in Children": Dr. Shedden Davis.
4.5 to 5 p.m.—"Common Foot Disabilities in Children": Dr. R. L. Stephen.

July 29, 1941.

9 to 10 a.m.—"Nephritis": Dr. Laurence Hughes.
10 to 11 a.m.—Selected medical cases: Dr. Robert Taylor.
11.15 a.m. to 12.15 p.m.—"Infant Feeding": Dr. Kathleen Winning.
2 to 3 p.m.—"Pyloric Stenosis and Hernia": Dr. L. G. Tait.
3 to 3.55 p.m.—Surgical cases in children: Dr. H. G. Humphries.
4.5 to 5 p.m.—"Spinal Tuberculosis in Children": Dr. Keith Smith.

July 30, 1941.

9 to 10 a.m.—"Chronic Bronchitis": Dr. Raymond Green.
10 to 11 a.m.—Ward rounds: Dr. Robert Taylor.
11.15 a.m. to 12.15 p.m.—"Pyelitis": Dr. Laurence Hughes.
2 to 3 p.m.—Surgical cases in children: Dr. C. Wesley.
3 to 3.55 p.m.—"Some Newgrowths Occurring in Childhood": Dr. Douglas Reye.
4.5 to 5 p.m.—"Fracture Treatment in Children": Dr. N. Little.

The fee for this course will be three guineas, except in the case of medical officers of the defence forces, who are invited to attend the whole or any part of the course free of charge if they are on full-time service.

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Applications for registration, accompanied by a remittance for the amount of the fee, must be made to the Secretary, the New South Wales Post-Graduate Committee in Medicine, the Prince Henry Hospital, Little Bay.

COURSE IN ANATOMY AND PHYSIOLOGY AT SYDNEY.

AN eleven weeks' course suitable for candidates for Part I of the examination for the degree of master of surgery has been arranged by the New South Wales Post-Graduate Committee in Medicine and, subject to a minimum number of six applications being received, will be held at the University of Sydney on Tuesday, Wednesday, Thursday and Friday afternoons on the following dates, there being two periods for recess during the examination and deferred examinations for third-year medicine: August 5 to 15 inclusive, September 2 to 19 inclusive, October 7 to November 14 inclusive.

The lecturers will be as follows:

Neurology: Professor A. N. Burkitt, Dr. J. C. Eccles, Dr. Gilbert Phillips.

Anatomy: Dr. A. A. Abbie (extremities), Dr. R. Hamilton Kenny (head and neck; embryology), Dr. J. Colvin Storey (thorax and abdomen), Dr. A. Duggan (female pelvis).

Physiology: Dr. A. A. Abbie (special senses), Dr. F. B. Byrom (endocrines), Dr. F. S. Cotton (cardio-vascular), Dr. W. I. T. Hotten (respiration), Dr. S. A. Smith (renal function).

Biological Chemistry: Dr. H. S. H. Wardlaw.

Supervisor of Course: Dr. A. A. Abbie.

The fee for attendance at the full course is twenty guineas, but parts only may be taken, the fees for attendance at which are as under: physiology only (19 lectures), £5 15s. 6d.; biological chemistry, all subjects (10 hours lectures and 20 hours practical), £10 10s.; physiology and biological chemistry (29 lectures), £12 12s.; anatomy only (32 lectures), £8 8s.; embryology only (7 lectures), £3 3s.; neurology only (14 lectures), £4 14s. 6d.; anatomy, all subjects (53 lectures), £12 12s.

Medical officers of the defence forces who are on full-time service are invited to attend the whole or any part of the course free of charge.

Applications for registration, accompanied by a remittance for the amount of the fee, must be made to the Secretary, New South Wales Post-Graduate Committee in Medicine, the Prince Henry Hospital, Little Bay, from whom full copies of the programmes may be obtained.

Note: The course will not be held unless there are at least six applicants.

NOTICE.

THE New South Wales Post-Graduate Committee in Medicine announces that the next library seminar arranged by the Post-Graduate Directors of Medicine, Surgery and Pathology will be held at the Prince Henry Hospital, Little Bay, New South Wales, on Monday, July 14, 1941, at 4.30 o'clock p.m. The subjects will be: (i) galactose tolerance in thyreotoxicosis, (ii) acute pulmonary œdema. A cordial invitation to be present is extended to all medical practitioners.

Correspondence.

INSULIN AND "CARDIAZOL" IN THE TREATMENT OF THE PSYCHOSES.

SIR: In the journal of May 24 Dr. Alan Stoller offered some criticism of certain statements in the Beattie-Smith Lectures. I would like to reply to this criticism, which may be summarized thus:

1. Too rapid an increase in the insulin dosage causes irreversible coma, and also leads to the state of affairs where an original coma dose of 400 units must be reduced to 150 units.
2. Glucose is administered too frequently by the intravenous and intramuscular routes.
3. Parenteral glucose causes boils.
4. A standard amount of glucose to terminate the coma is undesirable.
5. My treatment of spinal fractures is "complacent".

The theory that irreversible coma results from a too rapid increase in the insulin dosage has often been put forward, but there is a great deal of evidence against it; for example, David Lester (*American Journal of Psychiatry*, March, 1939), after reviewing a large number of cases of irreversible coma, is very sceptical of this theory, and states: "In half the cases the irreversible coma occurred during the 2nd, 3rd or 4th coma, and in this group the rate of increase of dose averaged 12½ units. In the other half the irreversible coma occurred on the average during the 20th coma, and in this group the rate of increase of dose averaged 10·6 units." Lester concludes "some patients possess a constitution which is unable to stand with average impunity a prolonged period of hypoglycæmia".

Cleckley and Templeton (*American Journal of Psychiatry*, January, 1941) report a case which had 21 uneventful comas, the last on 175 units; 100 units were then given with the object of "tapering" the dose, and this resulted in an irreversible coma.

Frostig and others have shown that insulin sensitivity occurs quite apart from any increase in the dose. These workers tube-fed patients with a standard diet and administered ten units of insulin daily in the fasting state. They found that the sensitivity to this small constant dose of insulin increased, or the "blood sugar quotient", that is, the $\frac{\text{Fasting blood sugar for the day}}{\text{Lowest blood sugar for the day}}$ steadily rose.

It is common for a patient to alternate between a state of sensitivity and a state of tolerance to insulin; for example, Gillman and Parfitt (*The Lancet*, September, 1937) report a patient who had his first coma on 50 units, dropped to 17 units for the fifteenth coma, yet required 150 units for his forty-first coma. This is a bigger percentage drop than my instance of 400 units to 150 units, and in my experience this swing from sensitivity to tolerance is not uncommon and is the important warning of an irreversible coma.

I agree with Dr. Stoller that a rapid increase in dose often results in a high initial coma dose; nevertheless I feel that a reasonably rapid increase is desirable, because it saves the patient from a tedious first stage of treatment and, provided the phenomenon of sensitivity is remembered, it is quite safe. I think the ideal is to reach the comatose state as quickly as is compatible with safety.

I agree that the duration of the coma, or better, the duration of the period of hypoglycæmia is a factor in the production of the irreversible coma. In recent months I have reduced the period of hypoglycæmia to rather less than five hours, and as a result irreversible coma has been almost eliminated. However, this is not the sole factor, because in Kraulis's method of treatment by artificially prolonged comas, the period of hypoglycæmia may be prolonged to twelve hours with perfect safety. We had a patient on Kraulis's treatment who had her coma dose of 180 units at 7 a.m., went into coma at 11 a.m., and was allowed to remain comatose without any sugar at all until 5 p.m., when she was given five grammes of glucose by gavage; at 6.30 p.m. the coma was terminated successfully.

I feel sure that no errors in dosage or faulty treatment would produce an irreversible coma in such cases, and this fact combined with the observation that a patient who has had an irreversible coma is very liable to develop the condition again, makes me agree with Lester when he says that the cause of the irreversible coma lies in the constitution of the patient.

As regards the excessive use of the intravenous route for the administration of glucose, I agree that its use should be confined to the treatment of complications, with the proviso that when the awakening by gavage is unpleasant, as it often is, the intravenous route is of definite therapeutic value.

I do not think it is fair to Sakel to quote his book, which nowadays is of historic rather than scientific interest; I would rather agree with Cameron and Hoskins when they state: "Experience has led us to disagree with Sakel on one point; we now utilise the nasal method rather infrequently; we regard promptitude of termination of the hypoglycæmia as generally advantageous."

Dr. Stoller's observation that boils may result from the parenteral administration of glucose is an interesting one. Such a possibility had not occurred to me, and I am grateful for the suggestion.

Again I agree with Dr. Stoller that a standard amount of glucose per feed is undesirable, and I regret that I did not make myself clear on this point. I recommended "about" 175 grammes of glucose, and the statement "It is not necessary to vary this amount, since irrespective of the dose of insulin, it is sufficient to awaken the patient . . ." was

meant as a warning against the use of excessive quantities of glucose. Our dose of glucose varies from 100 grammes to 200 grammes, the latter quantity in my experience being always sufficient to terminate a coma. (Compare Sakel's 440 grammes for a coma dose of 400 units.)

I certainly do not feel "complacent" about the problem of spinal injuries, but I think all the evidence goes to show that these injuries are not nearly as serious as one might imagine.

Cook and Sands (*The Journal of Mental Science*, April, 1941), after an admirable paper on vertebral injuries, conclude: "The significance of these fractures appears to have been greatly overestimated. We take this view because (*a*) we have found similar fractures in over 10% of idiopathetic epileptics, and yet no disability due to vertebral fracture has to our knowledge ever been reported as a complication of epilepsy, and (*b*) Kümmel's disease, which is the main cause of apprehensiveness, has not yet been observed in epilepsy, or after six years of convulsion therapy. This is particularly important as Kümmel's disease usually shows itself within the first year after the original injury."

If it is wrong, as Dr. Stoller suggests, to treat these fractures without a plaster jacket, it is at least equally wrong to induce further convulsions in patients who have sustained fractures; and since many, if not a majority, of these injuries are symptomless, Dr. Stoller should X-ray his patients after every seizure.

Recent work has suggested that curare may supply the ideal prophylaxis against these injuries; but in the meantime I think we should cease to be awed by the ominous words "fractured spine".

May I explain a few remaining points mentioned by Dr. Stoller.

The psychiatric state of the patients in the "follow-up" was discussed fully in the lectures; they did not show the sign of dyssymbole, but nevertheless were frank schizophrenics (providing one admits schizophrenia without dyssymbole), and for the most part were obviously and grossly psychotic.

I agree most enthusiastically with Dr. Stoller's practice of observing a patient for a time before beginning treatment; although it is sometimes frowned upon, this short delay has, I am sure, many advantages.

My statement: "Before the advent of 'Cardiazol', involutional melancholia had the worst prognosis of all", appeared during a discussion of the various types of melancholia under the heading "Results in Melancholia". It was meant to imply that involutional cases had the worst prognosis of all melancholias.

Finally, I would like to thank Dr. Stoller for his helpful remarks. The problems inherent in insulin treatment are of importance not only to psychiatrists, but also to the general physician (for example, the possibility of the irreversible coma occurring in the insulin-treated diabetic) and their solution depends in part at least on free discussion and constructive criticism such as that contained in Dr. Stoller's letter.

Yours, etc.,

R. RAMSAY WEBB,
Medical Officer,
Mont Park Mental Hospital.

Mont Park,
Victoria.
June 6, 1941.

A METHOD OF COVERING SKIN GRAFTS.

SIR: In the March 15 issue of your journal there is a suggested method of covering skin grafts. The method used in this hospital would seem to be much simpler than that quoted. A single layer of loosely woven gauze is stretched tightly over the grafts and held in position by strips of strapping applied along the edges. Next is placed a saline compress made of gauze, which in turn is covered by oiled silk and cotton wool. A firm bandage applies the necessary pressure.

The saline compress is changed every four hours, but the layer of gauze stretched over the grafts is not changed for seven days. This method applies pressure, keeps the wound moist, allows for the absorption of exudate, and gives extremely satisfactory results.

Yours, etc.,

H. COLLIN ROBJOHNS, M.B., B.S. (Adelaide), D.T.M. & H. (London).

The London Mission Hospital,
Tsaoshih,
Central China.
May 20, 1941.

THE EFFECT OF ŒSTROGENIC SUBSTANCES ON THE KIDNEY OF TRICHOSURUS VULPECULA.

SIR: The article by Dr. Bolliger and Dr. Canny on the kidneys of possums subjected to large doses of œstrogenic substances is particularly interesting.

I have been watching the effect of this hormone on the blood urea level of patients with a high systolic pressure at the menopause; the following case shows an average finding with moderate dosage of "Œstroform". It has been found necessary to give, in some cases, 500,000 units to produce menstruation; the dosage quoted below, however, is the highest I have personally given.

Mrs. S., aged fifty years, weighing 17 stone, was admitted to the Balaklava Hospital with a systolic blood pressure of 300 millimetres of mercury, a blood urea content of 37 milligrammes *per centum*, swollen ankles and general helplessness. Fifteen ounces of blood were removed; but a few days afterwards she became semi-conscious and a further pint of blood was removed. On her recovery paresis of the left side of the face and the left arm was present and her speech was slurred; these signs soon disappeared. She was treated with "Œstroform", 10,000 international benzoate units being given on alternate days. At the end of a week her blood urea content was 20 milligrammes *per centum* and her systolic blood pressure 225 millimetres of mercury. The dose of "Œstroform" was increased, so that at the end of a fortnight she had received in all 120,000 units. The blood urea content was now 10 milligrammes *per centum* and the systolic blood pressure varied from 220 to 160 millimetres of mercury. During this time the patient had had a moderate amount of proteins in the diet. The administration of "Œstroform" was stopped during the following two weeks, the blood urea content being 14 milligrammes *per centum*. After a further week a urea clearance test was made. After allowance was made for surface area, using the Du Bois weight-height formula, the renal function was 60% of the standard clearance. Estimation of urea in the urine was made by the hypobromite method, of urea in the blood by that of Hensch and Aldrich.

It will be some years before I can form a proper opinion of the effects, advantages or drawbacks of this form of therapy in cases of this type.

My objects in writing are twofold. Firstly, I wish to express my appreciation of the work of Dr. Bolliger and Dr. Canny, and of the lesson to be learnt from it. Secondly, I wish to point out that moderate doses of "Œstroform", while helping to relieve the subjective symptoms of the menopause, may also prove at least not deleterious to the patient from the point of view of blood urea content.

Yours, etc.,

E. A. JOSKE.

Balaklava,
South Australia,
June 11, 1941.

"ALCOHOLICS ANONYMOUS."

SIR: By your correspondent's review, "Alcoholics Anonymous" is an unusual book. It is evident in quite numbers of cases, not necessarily alcoholic, when the patient is in a psychological rut, that some such form of therapy is needed. Its simplicity, logical sequence and apparent certainty, if conscientiously applied, must make it suitable for psychiatric work.

In his article on rheumatoid arthritis in *The British Medical Journal*, June 10, 1939, Gordon gives prominence to the use of this type of therapy by Dr. Loring Swaim, senior orthopædic surgeon, Peter Bent Brigham Hospital, Boston. At the international rheumatic congress, Stockholm, 1936, Swaim said: "With a closer study of the mental and spiritual defects of a large number of rheumatoid cases I have found deep-rooted fears, worries, resentments and strain to be the basic causes of their ill health . . . I feel that we doctors have a unique opportunity to reach and meet people's deepest spiritual needs which so often result in the functional disturbances which in turn are forerunners of organic diseases."

Two years later, after referring to his orthopædic methods of controlling deformities, he discussed the psychogenic factors found in 66% of cases. "We find that emotional responses of fear, resentment, worries and inner conflicts are more important than the environmental factors themselves . . . The correlation of these neg. reactions with the joint flare-up was astonishing in the 275 cases under observation . . . Spiritually the rheumatoid arthritics studied had no vital faith and were therefore fearfully facing life's responsibilities alone . . . A deep religious faith is the most

effective faith, provided the doctor himself has such a vital faith to give." This is a valuable contribution to the most difficult psychological treatment of these cases.

Yours, etc.,

ALAN NELSON.

West Footscray,
Victoria,
June 17, 1941.

HOSPITALS AND THEIR EXECUTIVE OFFICERS.

SIR: Your article on hospital administration is timely. In Canada I visited two hospitals which were under the control of medical superintendents who were, I understand, paid adequate salaries. They knew more about hospital finance, the organization of hospitals, and the optimum size of a hospital than any others I have met. How they obtained their sound business knowledge I do not know, but they answered any question relating to hospital problems after the manner of experts.

A solution might be found in the manner you suggest. Let the hospital secretary take out a course in a medical school and become practically acquainted with the principles and practice of medicine. He might then administer the hospital as I saw it in Canada.

Incidentally one question I put received an answer which showed a grip of the problem of the optimum size of a hospital. The reply was not more than 300 beds, and then only if the hospital was built vertically and each floor devoted to one purpose and to some extent self-contained. An answer of that kind implied that the medical superintendent had thought out the problem from many points of view and had reached a definite conclusion.

Yours, etc.,

JAMES W. BARRETT.

103-105, Collins Street,
Melbourne,
June 21, 1941.

CRYPTOTROPHIC FACTORS IN NUTRITION.

SIR: As a physiologist Professor Osborne deserves our respect. When he discourses on dietetics he attracts our interest. In the address he has given recently he has traversed a wide range of facts, some of them not widely known, together with some opinions, all presented in such a way as to stimulate us to thought. For this we should be grateful. There are not many, and certainly I am not one of them, competent to traverse the whole field of his lecture. But on one or two points I find myself so strongly in disagreement with him as to feel compelled to offer some criticisms.

The marvellous perfection of instinct throughout the animal world is familiar to all students of Nature. Only in man is instinct a weak, imperfect and untrustworthy guide. What is usually described as instinct in human beings is something of a different sort altogether, being nothing else but habit more or less tinged with emotion. The guide of man is reason, an attribute for which he has an unmeasured capacity, of which in most of us only a small fraction is exercised. Few or none of those who have studied our food habits in practice as well as in theory will agree with Professor Osborne's almost unlimited faith in the value of human instinct in the choice of food.

Professor Osborne's dislike of wholemeal bread and bran as a matter of taste is of course beyond discussion. I am prepared to accept his statement that they are injurious to horses and pigs, but that they are similarly harmful to man will be rejected by a unanimous consent of competent opinion. That they do not agree with everyone is admitted: but these are rare exceptions, as any medical man can prove for himself. Here I would like to express my individual opinion that their aperient qualities are not due to mechanical irritation of the intestinal mucous membrane or, as it is termed, to "roughage". This may play a small part, but I believe the effect is mainly due to vitamin content. Certainly "roughage" cannot be conveyed to the infant in mother's milk; yet we can effectually treat sluggishness of the bowels in breast-fed infants by feeding the mother with sufficient wheat germ. Again, we have learnt that a few teaspoonfuls of a carefully strained infusion of wheat germ is the most useful laxative for the artificially fed infant, superior to many time-honoured aperients.

That in the process of evolution disused organs tend to weaken and disappear is universally accepted. It should be remembered that evolution, however irresistible and inexorable, works very slowly. Fifty thousand years ago—more or less—during an interglacial period in Europe there lived a race the physical counterpart of ourselves, and probably also our equals in mental capacity, though not, of course, in mental development. It is possible that in another hundred thousand years, as Professor Osborne predicts, men may lose their teeth, conditions remaining as they are today. It is a hazardous prophecy. I should think it more probable that conditions may change considerably before then. There is no escape from the conclusion that the deplorable state of our teeth has been caused by faulty feeding habits, and that these act rapidly, fifty years being sufficient to cause widespread damage. For instance, our own aborigines had, and still have, excellent teeth while continuing on their own diet. Today in Queensland, wherever they eat white man's food, their teeth are even worse than those of white men. It is false to assume that we need not trouble about our teeth because evolution is destroying them anyway. I am surprised that this old bogy should have been trotted out once more; but the spirit of defeatism is always irrational.

Yours, etc.,

A. JEFFERIS TURNER.

Brisbane,
June 22, 1941.

SIR: I read with interest the account of the meeting of the Victorian Branch of the British Medical Association published in your current issue, but was surprised at the gloomy picture of Nauru painted by Dr. R. T. Allan.

Having recently spent four and a half months on the island, I can assure Dr. Allan that, although dental caries does exist, the majority of the "spoiled" younger Nauruans possess teeth which the average Australian might well envy. During my time there I saw not a single case of appendicitis, gall-bladder disease or gastric or duodenal ulceration.

To one who, like myself, is only too familiar with the sorry spectacle of diseased natives in other parts of the world (Tahiti, Trinidad, Barbados), Nauru stands out in pleasant relief—a relief, I might add, made possible only by the unremitting efforts of the administration authorities, both lay and medical.

From a diseased dwindling people under the German régime the Nauruan race has now a marked upward swing and should reach the two thousand figure within the next few years.

In contrast to less fortunate territories, where native races are exploited, enslaved and exterminated, the achievements of administration in Nauru are those of which Australians may well be proud.

Yours, etc.,

K. VIGORS EARLE.

Sydney,
June 23, 1941.

ORAL VACCINES.

SIR: At the present time Melbourne newspapers and, we presume, those of other Australian cities contain large advertisements for certain so-called oral vaccines. They are phrased in pseudo-scientific terms and are obviously designed to attract potential purchasers who have some sense of the importance of genuine medical science. To any competent bacteriologist the claims made appear to be ridiculous and made either in ignorance of modern bacteriological thought or in bad faith.

Some indication of the ethics of the advertisers concerned may be drawn from one advertised statement that in *The British Medical Journal* of July, 1939, it was shown that less than 1% of 77,500 persons treated with an oral vaccine contracted disease. If one consults the paper in question (Grasset, *The British Medical Journal*, July 8, 1939, page 58) one finds that it refers to a test of the relative merits of oral and subcutaneous immunization against typhoid fever on the Witwatersrand; 77,500 native labourers were given oral vaccine and 638 (0·82%) contracted typhoid fever. This percentage was actually larger than that found amongst unimmunized labourers and much larger than the percentage found amongst persons immunized subcutaneously with Grasset's modified vaccine (174 cases in 152,400 immunized subjects—0·114%).

At a recent meeting of the Victorian Society of Pathology and Experimental Medicine the following resolution was passed unanimously:

> This meeting of the Victorian Society of Pathology and Experimental Medicine which is representative of the majority of bacteriologists in Melbourne is agreed:
>
> 1. That the treatment of any human illness by bacterial vaccines is a matter requiring a high degree of professional competence.

2. That it is of the essence of such treatment that the bacterial products must be introduced into the tissues or blood stream.

3. That there is no evidence that the administration of small amounts of killed bacteria by mouth has any effect either harmful or beneficial. Many millions of living and dead bacteria are swallowed daily with food and saliva.

4. That there is no evidence to show that disintegration of bacteria by chemical agents makes any difference to their inertness when given by mouth.

5. That claims for the therapeutic activity of small doses of disintegrated bacteria taken orally for the treatment of human disease are completely without scientific justification.

If the statements in this resolution are correct there is no justification whatever for the advertisement and sale of the commercial preparations referred to.

The Victorian Branch of the Association of Scientific Workers has been endeavouring to do something to reduce the abuse represented by these advertisements, and representations have been made to the State Health Commission of Victoria and to the National Health and Medical Research Council. Both bodies have expressed their sympathy with these efforts, and the following resolution was passed at the last meeting of the National Health and Medical Research Council:

> The Council strongly supports the representations made against the unscientific and pseudo-scientific advertising of persons and firms interested to capitalize the sincere desire of the best sections of the public to protect the health of themselves and their children.
>
> In view of the fraudulent impression produced upon the public to its disadvantage by such advertising, it is recommended that, where controlling legislation exists, it be strictly enforced, and that where no sufficient means exist for control, such measures be introduced.

In Victoria there is an adequate and well-administered *Stock Medicines Act* to ensure that all pharmaceutical or biological preparations advertised or sold for the prevention or treatment of disease in stock shall be of known constitution and of presumptive value. It is surely a grave anomaly that there is no such protection of the human community against exploitation.

In the present state of public opinion it would be futile to advocate the wholesale prohibition of patent medicine advertising, but biological preparations like vaccines, sera and hormonal preparations are in a special category. Is it not time for the medical profession and the educated public to insist that all such products should be issued from reputable laboratories and distributed only through the appropriate professional channels?

Yours, etc.,

JOHN S. TURNER,
Chairman.

F. M. BURNET,
Convenor of Subcommittee on Unscientific Advertising.

University of Melbourne,
Carlton, N.3,
Victoria.
June 23, 1941.

BRITISH MEDICAL ASSOCIATION ASSISTANCE TO MEMBERS ON MILITARY SERVICE, BRISBANE.

SIR: I did not intend intruding further upon your space in discussion of the Queensland scheme for assistance to medical officers, but the subject is of much importance and I have received a letter from Dr. Huxtable, of Southport, which I am forwarding to you, as his suggestions reveal a careful consideration of the matter, and I know there is much dissatisfaction with the scheme.

The scheme involves many thousands of pounds, and it fails to recognize the necessities and implications of the war situation. By last February the monthly levies had increased from £175 to £630.

Dr. Huxtable is desirous that his recommendations be offered for public (that is, medical practitioner) consideration, and I hope you will find space to publish the extracts I have copied.

Yours, etc.,

ERNEST CULPIN.

Ballow Chambers,
Wickham Terrace,
Brisbane.
June 24, 1941.

Degilbo,
Southport,
June 22, 1941.

Dear Dr. Culpin,

I agree with your letter of June 21, THE MEDICAL JOURNAL OF AUSTRALIA. As a matter of fact I wrote myself to Dr. Alex. Marks last week before seeing your letter.

The scheme is costing me now over — a month. Not that I mind paying up, but like you, I feel that money today is too precious to be expended carelessly. There are so many funds wanting help, and taxation requires careful budgeting for.

I would feel much happier if my money were going to a charitable fund to be built up and to be used: (1) for the dependants of those medical men who are killed or invalided, and secondly (2) for those medical men abroad whose means are limited and who apply for help for educational purposes for their children, and thirdly (3) for use after the war, for returned men who come under class (2), that is, for their children's education or who apply for means to enable themselves to do a year of post-graduate study.

Two other points which I mentioned to Dr. Marks: (1) If the fund were made a charitable one the Government might relieve our contributions from taxation. (2) As taxation rises all contributions to this British Medical Association scheme will diminish in size. For example, I think next year I will only be paying probably half as much per month. This means that the fund will gradually peter out in importance, and the large sums collected this year will all have vanished, and there will be insufficient left to help those who really need help.

With kind regards and best wishes,

Yours sincerely,

CHARLES HUXTABLE.

P.S.—You may go ahead and publish the views in this letter if you think it will help amend the scheme along the right lines.—C.H.

WELLCOME'S MEDICAL DIARY 1941.

SIR: We are pleased to advise members of the medical profession that a limited supply of Wellcome's Medical Diary 1941 has been received this week from London. We therefore respectfully ask doctors who desire a copy to let us know early. The distribution will be made in the order of receipt of requests.

Yours, etc.,

BURROUGHS WELLCOME & CO. (AUSTRALIA) LTD.

June 25, 1941.

Medical Practice.

THE TREATMENT OF PERSONS SUFFERING FROM ELECTRIC SHOCK.

THE State Electricity Commission of Queensland forwarded to the Queensland Branch of the British Medical Association a statement by Professor J. J. R. MacLeod, of the University of Toronto, Canada, on the treatment of persons suffering from electric shock. This statement is published at the request of the Queensland Branch.

Paralysis of the nerve centre which controls breathing is the cause of death in many cases of electrocution and, provided the heart has not been directly affected by the current, natural breathing can often be restored by artificial respiration. This allows the still circulating blood to be aerated in the lungs. The only method to employ is Schäfer's prone pressure method, and a pulmotor or any other form of apparatus should never be used. Since the paralysis of breathing may last for some time, it is necessary to continue artificial respiration sometimes for hours, and it should never be discontinued until it is absolutely certain that the heart has ceased beating. As far as can be judged by observations on electrocuted animals, no advantage is gained by using oxygen or carbon dioxide during the artificial respiration or by administering heart stimulants. It is important to see that the body is kept warm. After natural breathing returns the patient must be kept lying down and he must be carefully watched for several hours to see that the paralysis of breathing does not return. If it does so, artificial respiration must be reapplied.